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Determinants and Strategies for Exports of Agri-Food Firms

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PREFACE

As a result of the proliferation of FTAs (Free Trade Agreements), both imports and exports of agri-food have been expanding daily. Thus the importance of policies impacting agri-food exports has increased in terms of their effect on companies entering and applying the global value chain, associating agriculture and food industry, developing new markets, and creating jobs. It is therefore important to develop systematic export strategies in the farming industry. Unfortunately, there are insufficient studies evaluating domestic agri-food firms as leading export entities in this continuously developing overseas market. For this reason, this study analyzed the factors affecting agri-food companies entering and staying in the export market, and strategies influencing export performance. Based on the results of this analysis, we present policy implications for strategic determinants of export performance, effective strategies for each type of agri-food firm, and for export support programs.

We hope that the conclusion of this study based on analysis of exports of agri-food firms from various perspectives will be a basis for study and help stimulate future research for developing more detailed export strategies. Last but not least, we would like to thank all the people who helped and cooperated for this study.

October 2018
President, KREI
Kim Chang-gil

ABSTRACT

Background of Research

○ As a result of the proliferation of bilateral and plurilateral trade agreements, imports and exports of agri-food have been expanding daily. Thus the importance of policies impacting agri-food exports has increased in terms of their effect on companies entering and applying the global value chain, associating agriculture and food industry, developing new markets, and creating jobs. It is therefore important to develop systematic export strategies in the farming industry as well. Unfortunately, there have been few theoretical and empirical studies in the field of domestic agri-food and on the role of agri-food exporters as the core of new trade theory. Therefore the main purpose of this study was to analyze the determinants of exports and the factors influencing export performance for agri-food exporters. Based on the results of this analysis, we identified strategic determinants as per export performance and effective strategies for each type of agri-food firms, and deduced policy implications to improve export support programs. This study does have differentiated points as an empirical study that analyzed the impacts of characteristics, strategies, and in/out changes in the surroundings of agri-food firms on decision making and export performance.

Method of Research

○ For our analysis, we used literature review, statistical analysis, econometric analysis, surveys, interviews and expert consultation. Based on a review of precedent studies on the analysis for determinants of export activity and export performance, this study examined the theoretical and empirical backgrounds, and the status of agri-food exports by analyzing the current status of agri-food firms. Statistical data were collected from

various sources and used for the analysis. We further examined the effects of corporate characteristics and changes in the external environment on export decision making and export performance utilizing Statistics Korea's MDIS Business Activities of Statistics Korea, aT's performance data for export support projects, and so forth. By using the results of our survey of the agri-food firms, we also analyzed the relationship between export strategy and export performance by type of agri-food firm. The research model and the survey questionnaires were reviewed by experts and reflected in the study. We also conducted interviews mainly with high performance firms to complement the results of the empirical results.

Research Results and Implications

○ In our analysis of decisions by companies to export and the survival of firms in export markets, the sunk cost and productivity for exports had positive effects on export decision making in both agri-food and manufacturing industries, supporting the self-selection hypothesis of the new trade theory. On the other hand, the learning-by-exporting hypothesis, which suggests that productivity increases with the entry of exports, was not significant. In addition, productivity improvement positively influenced the export stability in the manufacturing sector, but not in the agri-food sector. Therefore, in order to expand exports in the agri-food sector, it is important to create an industrial ecosystem where many clearly differentiated agri-food firms can exist.

○ Our analysis of the stability of agri-food export routes found that companies with stable export routes had stable leads in agri-food exports. Our examination of the factors influencing the continuity of export routes showed that the probability of discontinuing export routes was increased by product diversification whereas the probability of continuing export routes was increased by market diversification. We also found that the existence of these same export routes had the direct effect of increasing the probability of continuing the export; the higher

the relative export price and the export subsidy rate, the higher the probability of discontinuing the export.

○ Using our survey analysis, we evaluated the relationship between export strategy and export performance (export per capita, export intensity, market diversification, export growth rate and years of continuing export) as well as the effectiveness of these export strategies. By analyzing entire company samples, we determined that the relationship between strategy and performance differed depending on what performance indicator was considered, and some strategies even had a negative effect on export performance. For example, strategies focusing on export risk management including supply management, export insurance, FX risk management, and etc. (by using export per capita as a performance variable) were found to be effective in improving export performance per capita; whereas strategies regarding monitoring of the export market, logistics, and distribution were found to be effective to improve export intensity. Strategies such as focusing on the main products, operating a brand management department, field surveys, and R&D investments were found to have positive effects on increasing the number of export markets but not on export per capita or export intensity. By analyzing the effects of continuous exports by region and product group, we observed that securing steady export volume had a positive impact on years of continuing export, export growth rate, and so forth. Therefore, focusing on the main products was effective in improving export growth and targeting overseas Korean customers. Furthermore, acquiring certification and managing mid & long-term export plans were effective in maintaining exports. Thus, in addition to policy support for productivity improvement of agri-food firms in general, it is advisable to improve the delivery of overseas market information, and expand support programs for joint marketing and logistics infrastructure in export markets for better utilization by the firms.

○ To identify effective export strategies by type of agri-food exporter, we divided the surveyed firms into four groups prior to analysis. Based on

the results of the surveys and investigation of company practices, we came up with the following political directions by complementing the results of quantitative analysis.

- In the case of exporting fresh agricultural products (type A), we found that emphasizing the health benefits of the product, labeling in local languages, cooperating with local distributors and managing export risk improved both export value and export intensity. We also show that the possibility of expanding the pertinent market for type A firms could be increased if they met the quarantine requirements as well as the conditions of local marketing and logistics. Thus, policy instruments such as local marketing support and provision of measures to improve price competitiveness would be important for expanding the export market of fresh agricultural products. In addition, since export insurance and overseas promotional programs are highly participative, the efficiency of export support can be improved by reinforcing policy instruments.

- In the case of small exporters of processed agricultural products (type B1), focusing on current export markets along with developing potential markets such as niche markets and pursuing export stability through export volume and risk management were shown to be effective in improving short-term export performance. On the other hand, in the case of medium-sized exporters of processed agricultural products (type B2), aiming at large markets rather than niche markets, seeking market diversification and investing in R&D would be effective strategies to improve export performance. Therefore, support programs to target niche markets and to improve quality and technology competitiveness would be effective for expanding exports of type B1 products, whereas continuing support by reinforcing existing policies can help stabilize the exports of the agri-food industry as a whole. Putting all the results of the surveys together, providing information on new markets and their non-tariff barriers would enable B1 and B2 firms to advance in these markets, while the type B1 firms can make inroads into new markets if this is preceded by initial investment support.

- In the case of consignment production exporters for processed agri-food (Type C), these companies can focus on marketing and specialization of exports relatively better than the other types of companies, so related strategies would be effective to improve export performance. Type C companies have competitive export strength but have difficulty penetrating new markets due to factors such as non-tariff barriers. Therefore efforts to lower non-tariff barriers in trade negotiations would enable type-C firms to expand their export market. Thus, in order to expand overall export in the agri-food industry, it is also necessary to develop policies to increase the export intensity of competitive exporters such as type-C firms.

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Chapter 1. INTRODUCTION

1. Need and Objective of Research

As a result of the proliferation of bilateral and plurilateral trade agreements, both foreign imports and Korean exports have been expanding daily. Thus systematic export strategies for agri-food exporters in the farming industry are needed and especially vital since they are utilizing the global value chain[1] where adding high value to products and services are particularly emphasized.

In the past several years, Korean agri-food exports have continuously increased. According to FAO, the growth rate of world agri-food exports was 2.1% in 2008 ~ 2016 while that of Korea was 8.7%. However, the agri-food sector accounts for only 1.2% of all Korean exports compared to 7.7% of all world exports (as of 2016).[2] The export value of the agri-food sector has been continuously increasing but other industries have grown as well, leading it to stay at 1% of Korean exports.

The Korean government has provided various support programs and de-

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[1] The global value chain means a series of process (entire process from planning, producing, packaging, and to selling) where goods or services are delivered to the end consumers while they are distributed among companies across various countries. (UNCTAD 2010).

[2] Data for agri-food export: FAOSTAT(www.fao.org/faostat: 2018. 11. 1.), Data for product export: UN COMTRADE(comtrade.un.org: 2018. 11. 1.).

voted large-scale budgets to actively expanding agri-food exports. There are several reasons for this, including the political importance from the perspective of associating agriculture and the food industry, adding value and creating jobs by penetrating new markets, and entering into the global value chain and its utilization. Conventional agri-food export policies have focused on fresh produce or simple processed food due to the associated positive effects of increased farm income, mitigation of domestic oversupply, and price stabilization by expanding agri-food exports. Because agri-food export markets tend towards neighboring countries with similar food culture and where many overseas Koreans live, capital and technology intensive items rather than land and labor from the production perspective have been getting the spotlight as promising export items for fresh produce and simple processed agri-food. Consequently, agri-food export related studies have been conducted on export items with comparative advantages and overseas markets with relatively good conditions for export development in terms of establishing export infrastructure, organizing producers, reducing logistics cost, at-site consumer surveys, etc.

On the other hand, there have been few theoretical and empirical studies in the field of domestic agri-food on the role of agri-food exporters as the core of new trade theory[3] replacing traditional trade theories based on national level comparative advantages. There have been trials to seek win-win cooperation between enterprises and agriculture aiming to expand export by having enterprises participate in agriculture. However, concerns that enter-

[3] Traditional trade theory is represented by David Ricardo's comparative advantage theory and the theorem of Hecksher-Ohlin while it describes that specialization among countries occurs depending on the productivity level (level of technology advancement) and the level of resource possessed resulting in international trade for respective specialized industries to resolve the problem of unevenness of production resources. However, the type of trade where various countries export same products among countries ever since 1960s is hard to be explained by this traditional trade theory. Krugman(1979) explained that trade can occur in the same industry by applying the theory of increasing returns to scale and imperfect competition(monopolistic competition) to the international trade while it was acknowledged as new trade theory.

prises might compete with farmers or enter into agriculture for the purpose of farmland speculation, rather creating new value through technological innovation, have dominated other concerns and prevented such trials from proceeding in earnest.

Nevertheless, it is known that putting enterprise at the core of exports can realize economies of scale with regard to the accumulation of production technology and management know-how, penetration of overseas markets, securement of sales networks, effective enhancement in the value chain, and acquisition of capital finance.

With the exception of a small number of conglomerates, SMEs or small exporters make up most of the agri-food exporters in Korea. It is therefore important for policies to establish institutional frameworks helping these companies to strengthen by accumulating export knowhow, technology innovation, new product development, and R&D investments. The expansion of agri-food exports can lead the way to improved productivity and increased value added. This creates jobs not only for the agriculture industry, which is already facing many issues such as an aging workforce, congested scaling, and oversupply, but also for all the related industries, including the food industry, that can utilize economies of scale.

Keeping this background in mind, this study was conducted to analyze what the determinants of export for agri-food exporters are and what factors have positive effects on export performance. The total exports of a company can be increased by increasing the export volume (amount) of existing export items (Intensive margin), by exporting new items to existing markets, or by developing new markets to export the existing items (Extensive margin). The former demonstrates how solid the export is and how stable the growth is, whereas the latter is an important factor from the perspective of expanding the scale of exports, increasing export routes, and generating faster growth. Based on the results of this analysis, this study has some policy implications which can be referred to in order to improve export support programs and help to identify the features of effective export strategies based on strategy determinants for export performance and by type of agri-food firms.

2. Precedent study and Distinctiveness of this Study

2.1. Theoretical background[4]

Traditional trade theory based on conventional comparative advantages cannot explain the vibrant intra-industry trade wherein developed countries with little difference in the level of technology and natural resources import and export heterogeneous products in the same industry at the same time. At the start of the 1980s, many experts believed that this intra-industry trade occurred among developed countries mostly due to an imperfect competitive market structure caused by economies of scale, production technology that provided higher profit margins, product differentiation by companies, and consumer's pursuit of diversity (Krugman 1979, 1980; Lancaster 1980; Helpman 1981).

The market structure of imperfect competition is mostly the result of economies of scale. Especially if products are heterogeneous in the same industry, economies of scale would play a role in promoting a monopolistic competition structure wherein a number of companies sell differentiated products to generate their own market dominating power (using the supposition that a company produces a single product).

Since heterogeneous products are mostly produced in industries that require accumulated technology, knowhow, and capacity for innovation, the initial fixed investment or sunk cost, namely 'industry entering cost' is relatively high, thus economies of scale take place. As the number of differentiated products increases, the degree of availability will be higher due to the broader range of selections that consumers can have.

However, the volume that a single company can supply will decrease as the number of companies increases due to the limited market where similar products compete with each other in a monopolistic competition structured

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[4] Written by referring to Moon(2010), Joo-Ryang Lee et al.(2014), Han-Pil Moon(2018).

industry. Companies unable to bear the increase in average cost due to the decrease in sales volume will be liquidated while the diversification of products will also decrease (Han-pil Moon 2018).

Thus "differentiated products producing company's pursuit of economies of scale" and "consumer's needs for product diversity" function as mutual constraint factors. Krugman (1979) insisted that international trade is the way to solve this issue since international trade can expand the market to sell the products of said industries. Each company can expand its production scale, thus reducing the average production cost. Eventually, the consumers of each country can consume new products from other countries through this international trade. In addition, the reduced average cost by trade yields decreases in the average price of products and increases in consumer's actual income (Han-pil Moon 2018).

Intra-industry trade takes place between two countries with little difference in the level of technology and natural resources due to producers of differentiated products and consumer's needs for product diversity. This kind of intra-industry trade can confer a benefit on diversity and actual income growth for all the entities of the economy. It is contradictory to the idea that the welfare of all involved countries would increase but there would be some contracted industries in the traditional trade theory (Han-pil Moon 2018).

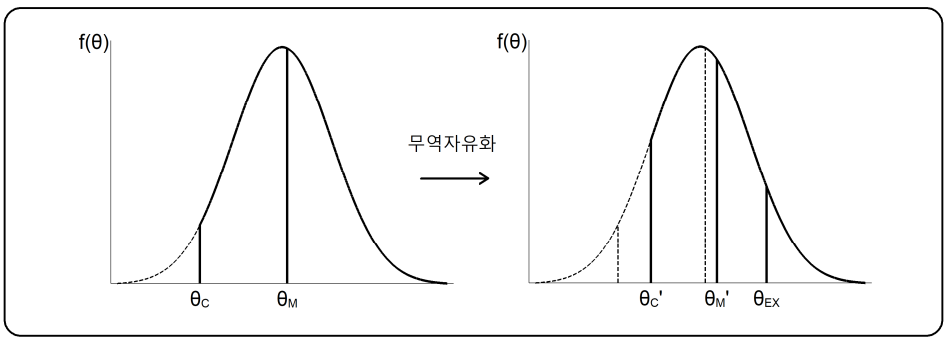
Melitz (2003) proved how free trade can create new levels of benefits by combining the income increase as per the scale up, monopolistic competition market structure, and consumer's preference for diversity, if there are 'heterogeneous firms' producing differentiated products in the industry with economies of scale.

Melitz's (2003) heterogeneous business model is based on the following three assumptions. First, there are a variety of companies with different productivities, thus implying a product's distinctiveness in the industry with economies of scale (monopolistic competition market is assumed). Second, the productivity distribution of heterogeneous companies is a normal distribution while the shape of the distribution will be determined by the level of technology of the country or industry (comparative advantages among countries are assumed). Third, each company invests fixed cost at the point of its respective productivity in the distribution, then the cost will be realized after the company enters into the industry. Based on the foregoing assumptions, <Figure 1-1> illustrates the productivity distribution of an

industry. The productivity of a company would be higher if located further right on the θaxis, implying productivity further left means lower productivity of a company. In other words, the companies located further right on the productivity distribution scale of the industry would have lower marginal production costs, while those located towards the would have higher marginal production costs (Moon 2010; Joo-Ryang Lee et al. 2014: 21).

After entering into a relevant industry, a company that can acknowledge their relative productivity levels recovers its fixed costs but if it is below the θ_C, the minimum level that can create profits it will exit from the industry. Based on the foregoing, the productivity of this industry has a shape of left-truncated distribution, and the average productivity becomes θ_M. If free trade takes place in this industry under these circumstances, then foreign companies, which can bear all the fixed costs for export such as overseas market research costs and cost for securing logistics network, together with variable costs such as tariff and transportation cost, will enter into this domestic market. At that point, domestic companies with relatively low productivity will be liquidated while the minimum entry level of productivity will be higher at θ'_C. As a result, the average productivity of this industry is increased to θ'_M. On the other hand, the domestic companies with high level of productivity bearing additional costs for their international trade can make inroads into overseas market thus increasing profits. This can apply to the small number of companies with the level of productivity above θ_{EX} in the right side graph of the <Figure 1-1> (Moon 2010; Joo-Ryang Lee et al. 2014: 22).

<Figure 1-1> Changes in productivity distribution of a monopolistic competition industry before and after the free trade



Source: Joo-Ryang Lee et al.(2014).

While it is common knowledge that an individual company can increase its market share and profits by improving its productivity. Melitz's (2003) 'heterogeneous business model' is acclaimed for providing a new theoretical background for free trade where the average productivity of an entire industry can be increased by self-selection in exports and intensified competition due to an increase in imports without any increase in an individual company's productivity. The Melitz model also drew the positive conclusion that the production resources of liquidated companies due to the intensified competition as per the market-opening, are reemployed by the new entries and companies with higher productivity (which need to increase their scale by export) leading to redistribution of the production resources in the industry (Moon 2010; Joo-Ryang Lee et al. 2014: 22).

Furthermore Lileeva and Trefeler (2010) recently presented research that showed that companies, which used the excess profit from free trade were able to gain much more from advanced manufacturing technology by improving labor productivity and by focusing on product innovation. They also paid attention to the fact that the foregoing factors acquired by free trade induce companies to put more investment in R&D. While the companies with high expected return on R&D investment, which currently do not have high productivity but believe they can maximize profits once the market expands due to increased trade, enter into the export market. These differences in efforts to improve their productivity also reinforces their differentiation, thus increasing the average productivity of the entire industry. Therefore this can be seen as a broadening of the 'gain of trade' view that was newly proposed by Melitz.

According to the new trade theories developed since Krugman, the companies in the industry with economies of scale can produce their differentiated products by adding their own characteristics, while trade provides the companies with more opportunities to utilize the economies of scale thus targeting the more expanded world market. The consumers of each country also have more variety of products to select from which increases their usefulness. Thus, it was found that economies of scale and monopolistic competition, apart from their comparative advantages, are the cause of intra-industry trade. Intra-industry trade creates new type of trade benefits such as reduction in industry's average costs, increase in average productivity, and expansion of product diversity.

2.2. Research on determinants for export

The majority of research dealing with determinants of export activity is mainly empirical analysis of fixed costs and productivity for export, and the relationship between the company's characteristics and export activity based on the previously reviewed theoretical background.

The studies analyzing the relationship between export activity and productivity are vibrantly conducted and there has been various empirical analysis conducted before Melitz (2003). These studies were designed to investigate not only the causality between export activity and productivity but also the direction in which these effects operate. It can be represented mainly by two research hypothesis: one is the self-selection that the productivity has positive effects to export, and the other is learning by exporting that the company's productivity is enhanced by export. Wagner (2007, 2012, 2013) organized the research results of empirical analysis by various countries.

Bernard and Jensen (1999) published the representative research showing that companies with high productivity (good firms) are the ones that export and that export activity improves the performance of companies. The results of their analysis confirmed that the companies with high productivity became exporters. Both growth rate and success measures are shown to be high for the exporters. On the other hand, the effect that export activity has on the performance of the company is uncertain. The rate of increase for employment and survival probability are higher for the exporters whereas it is shown that export activity does not necessarily improve productivity and increase income level.

According to Wagner (2007)'s theorem, the self-selection theory is more consistently identified than the learning by exporting theory in most of the studies. However, the research by Baldwin and Gu (2003), Van Biesebroeck (2005), and De Loecker (2007) proved that the theory of learning by exporting effects was validated using national data from Canada, African countries, and Slovenia. The study of De Loecker (2007, 2013)[5] as

[5] De Loecker has proceeded the study based on the Slovenia business data since

a representative work based on Slovenia business data (1994~2000) after controlling the self-selection effects proved that theory of learning by exporting effects and that specifically the export market entry effect as per the productivity was valid. De Loecker (2007) showed that the learning by exporting effects by industry took place at various timings and the effects were higher for companies exporting to developed countries. In the case of the Slovenia food industry, the learning by exporting effects took place two years after exports started. The author also explained that the effect of productivity improvement occurred through starting to export rather than through the export activity on its own.

Studies regarding the relationship between the exports of Korea and productivity have been conducted by Aw et al. (2000), Hyun-Ho Kim & In-Yong Shin (2008), and others. Aw et al. (2000) showed that the relationship between the exports of Korea and productivity did not seem to be significant. On the other hand Hyun-Ho Kim·In-Yong Shin (2008) using the dynamic estimation method showed that the learning by exporting effects did take place between two parties in Korea but self-selection effects did not occur.

2.3. Research on determinants for export performance

The studies of Cavusgil and Zou (1994), Shoham (1998), Zou and Stan (1998), Carneiro et al. (2016) represent the current research on the export performance of companies. According to these studies, items such as export

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2004, and presented the complemented research in 2013 in continuation of 2007 presentation. According to De Loecker(2007), explained that the learning by exporting effects could more easily be identified in the data of economic transition era or the countries in the situation. The study of 2013 was a developed version of model used in 2007 where the model was complemented for the productivity is endogenously determined as per the experience. The author explained that the export dummy, level of export concentration, or export value can refer to as export experience while he used the export dummy.

value, export intensity, export profitability, growth rate of export, a company's satisfaction on export performance, and export sustainability (survival) are referred to as export performance. Many researchers who analyze export performance determine their export performance indexes by referring to these particular studies. Shoham (1998) in particular itemized the export performance indexes as turnover, rate of return, and rate of change. Export intensity and export value can be used as a concept of turnover, whereas the rate of return on assets or investment and the limited rate of return can be used as a rate of return. In addition, the export value rate of change, export intensity rate of change, export market diversification, and export sustainability can be used from the perspective of rate of change. A company's subjective satisfaction can also be included as an export performance index.

A. Research on determinants of export value

Dong-Yoon Oh (2012) analyzed export trade data of SMEs and Conglomerates from KITA to determine how the export destination countries' (35 states) GDP, population, tariff rate, changes in FX, OECD member nation status, and culture index affected export value. The results of their analysis showed that Korea's SMEs were affected to a greater degree by the changes in environment of the export destination countries compared to the conglomerates. SMEs cannot quickly cope with the economic growth of the export destination countries compared to conglomerates. As the distance from the export destination country increases and the tariff increases, the export value for a company decreases, leading to greater reduction for SMEs. It was also found that cultural differences in export markets affect SMEs more than conglomerates.

Jung-Gon Kim et al. (2014) empirically determined that a lack of information on the laws and system of overseas markets could be an export market entry barrier for SMEs. He utilized the Korea Customs Service's export data of 2002~2013 and found that the complexity of laws and systems in overseas markets, especially the complexity in resolution of contract disputes, had more negative effects to SMEs than conglomerates. Therefore he

concluded that government support is needed with regards to the foregoing, especially focusing on the vulnerable SMEs.

By examining the value of agricultural exports based on the item, export destination country, and year together with the basic gravity model Han-pil Moon et al.(2012) analyzed how fresh produce exports are affected. Specifically, to measure the effects of export support programs, he used the accumulated amount of support for export promotion as a variable excluding the support for export logistics and logistics costs. The results of his analysis show that the government's export support programs (export logistics cost support and others) had positive effects on export expansion. The effects of export logistics cost support were prominent for fruits and flowers while the promotion support including other infra support was most effective for mushrooms. It was also found that fresh agricultural product exports would increase as the economy of overseas markets increased, especially for markets with closer proximity, whereas the per capita national income and relative FX rate had little effect.

B. Research on determinants for export intensity

By using business unit data, Sterlacchini (2001) analyzed how factors such as scale, business collaboration, geographic location, and corporate innovation (portion of R&D personnel) of a company or industry affect the export performance (export probability) and intensity of export (Intensity, export value/turnover) of manufacturers in Italy. Sterlacchini used the logit and Probit model for the analysis while the effects of variables were varied depending upon the scale of the analysis results. The major results of his analysis can be summarized as: 1) For small companies with low turnover, the scale and export performance had a positive relationship, 2) the relationship between business collaboration and export performance was negative for SMEs but positive for conglomerates, which is because SMEs mainly conduct business collaborations for the domestic market but conglomerates have international business collaboration, and 3) R&D generally has a positive relationship with export performance but some react differently depending on the scale of company.

Using Germany's manufacturing business data, Wagner (2006) analyzed how export intensity affected the characteristics of a company by utilizing quantile regression. This study found that the effects of the export intensity on the characteristics of a company varied by quantiles. Firstly, it was found that the scale of company had effects only when the intensity of export was at the low 1/4 quantile while the fact that it has a subsidiary had significant effects when it was at the upper 1/4 quantile. The effects of R&D also varied by quantile, while the presence of patents did not have significant effects on the low quantile.

Using business unit data, Iyer (2010) analyzed the factors that had effects on the intensity of export (Share of export value on turnover) of New Zealand's agriculture and forestry industries (including manufacturing and services). The analyzed data was New Zealand's Longitudinal Business Database which Iyer analyzed by using data from 2000~2006 with the panel possibility effect model. Labor productivity, employment scale, number of export markets, number of export items, corporate age, domestic market share, sector intensity of export, number of exporters by sectors were all considered as independent variables. As a result of the analysis, it was found that better labor productivity yielded higher intensity of export. They also found that the diversification of export markets and export items and the intensity of export had a positive relation.

C. Research on export sustainability and analysis of determinants

Prior studies regarding the sustainability of trade have mainly dealt with the sustainability of bilateral and plurilateral trade relations by using the entire industry type or manufacturing trade statistics (Besedes and Prusa 2006a, 2006b, 2011; Nitsch 2009; Obashi 2010; Hess and Persson 2011, 2012; Cadot et al. 2013). In the field of agri-food, Peterson et al. (2017) had recognized the importance of the sustainability of the import countries importing fresh vegetables and fruits (HS 6 digit detail #) from the U.S. during 1996~2008 and drawn the affecting factors.

For industrial studies outside of the agri-food fields, there are reports by Fugazza and Molina (2009), Ilmakunnas and Nurmi(2010), Pérez et

al.(2004), Fu and Wu(2014), etc. Fugazza and Molina (2009) analyzed export sustainability of items by nation and what factors had effects on sustainability. The authors established a database by using the export value for HS 6 digit items from 96 nations, variables by nations from the World Bank, CEPII, and so forth. They analyzed this database using the Cox proportional hazard model and found that the period of continuing export would increase as the economy level increased, whereas the risk of exports ceasing would be lower if the export product was differentiated. They also found that the possibility of exports ceasing would be higher as export costs were higher, but these effects weakened over time.

Ilmakunnas and Nurmi (2010), Pérez et al. (2004), Fu and Wu (2014) used discrete time event analysis and calculated the pattern of exporting periods and the possibility of exports ceasing for manufacturers from Finland, Spain, and China. They then analyzed the factors that had effects on the continuation of exports (risk of export being stopped). Ilmakunnas and Nurmi (2010) separately estimated the export entry and export stop model. As a result of their analysis, it was observed that the possibility of export entry would increase and the risk of export stoppage would decrease based on the following characteristics: the higher the company employment, the older the corporation, the degree of internationalization of the company (if the overseas capital is over 50%, then it is an overseas company), the higher the capital intensity, the higher the labor productivity, and the higher the exporters portion in the industry export. It was also found that the price/cost margin, and the fact that it is a multi-unit company or not were statistically significant only for the model of export being stopped while the risk of export being stopped would be lowered if the number of companies one possesses is lesser . The GDP growth rate was also considered as an external environmental factor but was not found to be statistically significant for both models.

Pérez et al. (2004) and Fu and Wu (2014) showed similar results in their studies. It was found that the risk of exports ceasing would decrease when the scale (employment) was bigger, labor productivity was higher, and the export intensity is higher. Fu and Wu (2014) compared the effects of explanatory variables for the time when considering unobserved heterogeneity of the observed value, and the other way around while it is found that the

effects mostly occurred in a constant manner.

As an example of a domestic study, Sang-sik Jang (2015) analyzed the export sustainability of business units. He analyzed the determinants for exports continuing or stopping on a yearly basis by utilizing KITA's business unit export data of 2003~2014. Additionally, he conducted surveys and further examination of exports continuing or stopping based on the data actually being used by the business units. In the analysis of determinants for exports continuing or stopping, the Probit model was used, whereas the exports stopping or continuing were dependent variables, and the number of export items, number of export countries, export value, item dummy, and country dummy were used as independent variables. As a result of this analysis, it was found that the factor most affecting the continuation of exports was an increase in the number of export countries rather than in the number of export items. It was also found that mineral products or chemicals as export items and Japan as the export destination country gave a higher possibility to continued export. On the other hand, export sustainability was very low for agriculture, forestry, and fishery products. Additionally, the export sustainability for the Chinese market became lower for new exporters to the market in the latter period than that in the earlier period.

D. Other research regarding export performance

Yu-Hyun Nam and Cheol Lee (2013) analyzed the determinants of export performance by using an integrated model they developed by combining the E-S-P based on industrial organization theory and resource-based theory (which is perceived to be a major theory of determinants for export performance), the RBV model, and relational perspective based models that appeared after the mid 1990's. The data was collected by conducting surveys from domestic manufacturers who were exporting overseas and the structural equation was used as the analysis method. Their developed integrated model has a high degree of model fits. It also better explains the export performance than using each individual model. This model also explains the determinants for export in a more comprehensive view than from

a single point of view. As a result, they found that both competitive advantage and the quality of relationship with importers in the export market have positive effects on the export performance.

Hui-Yong Lee, Jung-Hyun Yoon and Taek-Dong Yeo (2011) observed that the organizational characteristic variable, management characteristic variable, environmental characteristic variable, and technological characteristic variable all have effects on the globalization of business (including export activities) and suggested that the government's export support programs have significant effects on the relation between the above variables and globalization of a business. The data were collected by surveys and they drew out factors by using factor analysis (principle component analysis) in order to verify the validity of these characteristic variables. As a result of conducting a moderated multiple regression analysis (cross variables) with the drawn factors, they found that R&D capabilities, global directivity, the overseas market environment, technological competences, and technological imitation improved globalization, whereas the effect these characteristic variables had on globalization varied as per the government's export support programs.

Jung-Gwon Kim (2001) conducted an analysis based on the conceptual frame among environmental factors ranging from the ins/outs of companies, their export marketing strategy, and export performance, which Porter and others had previously presented. Kim collected the data for export industry/market's characteristics, corporate characteristics, export marketing strategy, and export marketing performance by conducting business surveys. In order to analyze the relationship among the environmental factors, export marketing strategy, and export performance, the factors were abstracted by using exploratory factor analysis. A research model for confirmatory factor analysis was then established based on the foregoing. He found that product adaptation, promotion adaptation, support for overseas distributors/subsidiaries, and experience in export were the major determinants for export performance through the confirmatory factor analysis and path analysis. Whereas the factor of price competitiveness was found to have relatively little effect.

2.4. Research on agri-food export strategy

Studies regarding the agri-food export strategy have been conducted extensively. The majority of the studies target export expansion at the national level and have established export promotion strategies and presented recommendations for improvement.

Gi-Hwan Park et al. (2013) identified some of the pending issues and evaluated the current status of agri-food exports through the surveys of dedicated horticultural production complex and processed food exporters, the degree of concentration on export destination countries, and review of government support programs for processed food. They then presented the mid & long-term policies vital to promote agri-food exports. The basic guidelines of the suggested policies are to establish infrastructure for securing stable export volume, to promote export oriented items, to strengthen the relationship between agriculture and processed food export, and to expand the market deviating from the dependency of specific export market.

Gyeong-Pil Kim & Jung-Hoon Han (2015) investigated the government's support programs for export organization and then presented promotion measures for better sustainable export organization by identifying their actual condition of operation. In particular, they emphasized the need to enhance efficiency of the promotion program, which the government conducted to systematize producers and exporters. Their analysis showed that export leading organizations that promoted for the systematization of producers and exporters did not have better efficiency than the non-leading export organizations in terms of operation performance (export value, unit cost for export). In addition, they analyzed the factors affecting an export organization's operational performance. They then presented the measures needed to enhance the relationship between exports and distribution organizations, and listed the recommended core tasks by main agent and the type of export organization.

Myeong-Geun Uh et al. (2011), and Gyeong-Pil Kim, Sang-Hyun Kim and Jung-Hoon Han (2017) conducted overseas consumers' surveys and market characteristic surveys for Korea's export destination countries or newly entering markets. They then presented the improvement measures

they deemed vital for Korea's export support programs and export strategies by countries and products. Myeong-Geun Uh et al. (2011) looked for solutions to expand agri-food export by mainly focusing on the newly rising export countries (Vietnam, Russia, and etc.). They estimated the market share of items by analyzing export performance, reviewing the government's export support programs, conducting actual field surveys and consumer surveys. By evaluating all of these, they drew suggestions for the direction for government or local governments' production support policies. They then emphasized the need for creating social requirements that exporters can pioneer overseas markets and further develop promising items. Specifically, they classified the agri-food export marketing strategy into three domestic stages (production, merchandising, and export logistics) and three overseas stages (quarantine & customs clearance, import distribution, overseas consumers' purchase) and then proposed the strategy important for each stage. Gyeong-Pil Kim, Sang-Hyun Kim and Jung-Hoon Han (2017) conducted consumer surveys of two important export markets, Vietnam and UAE. They further investigated the difficulties, successful entry, and entry failure samples by export stage for domestic exporters in order to refine the strategy to expand Korea's agri-food export markets. As a result of the consumer surveys, they found that the factors affecting Vietnamese consumer's purchases of South Korea's agri-food are cultural factors including dramas and the images of South Korea. Whereas the major factors influencing consumers from the UAE were images of South Korea, interest in safety, Halal certification, and functionalities. Based on the results of their analysis, they suggested an export strategy focusing on selection of main items by export markets, enhancement of quality and price competitiveness, merchandising strategy, and marketing/promotion strategy. In addition, they also comprehensively presented the roles of main agents (producers, exporters, and government) on the tasks important for expansion for export markets and support programs for each stage.

2.5. Distinctiveness of this study

Previous research on agri-food exports has primarily focused on presentation of policy issues to improve competitiveness of the agri-food industry unit and to expand export markets. Thus there have been few studies on the business unit as a main agent of agri-food export as compared to other industries such as manufacturing. In addition, many studies have focused on fresh produce, thus resulting in insufficient analysis on the food industry, which is one of the main components of agri-food exports.

This study conducted business unit analysis differently from many previous analyses conducted on agri-food exports based on national level trade data or industrial level data. Specifically, this study analyzed the factors that differentiated characteristics of heterogeneous agri-food firms that have effects on the determinants for export. It also analyzed from multi-angled perspectives the relationship between business strategies and various export performance indexes considering the agri-food firms by type, item groups, and export destination countries. With that in mind, we review the agri-food firms' differentiated export expansion strategy and best practices and then propose policies for export expansion of the whole agri-food industry. Therefore, this study is distinctive from the standpoint that it is an empirical study analyzing the effects of agri-food firms' characteristics and strategy, the in/out environmental changes on the determinants for export and finally export performance.

3. Contents and Method of Research

3.1. Contents and range of research

This study defines agri-food firms as corporations involved in agriculture, food production, and export. Among these agri-food firms, it is known that the companies involved in the export of processed food are relatively sizable whereas the majority of exporters dealing in fresh produce or simple processed food are small businesses. Agri-food firms are diverse types of companies, for instance, commodity unit exporters or exporters who work only on produced agricultural products in the dedicated horticulture complex, exporters leading the supply and quality management by connecting or systematizing individual farms and producer organization, agricultural association corporations which producers directly deal with for export, export union corporations being jointly invested by a number of exporters and producers' organizations, and many other participants in the export market dealing with vegetables, fruits, flowers, short-term forest products, and simple processed food.

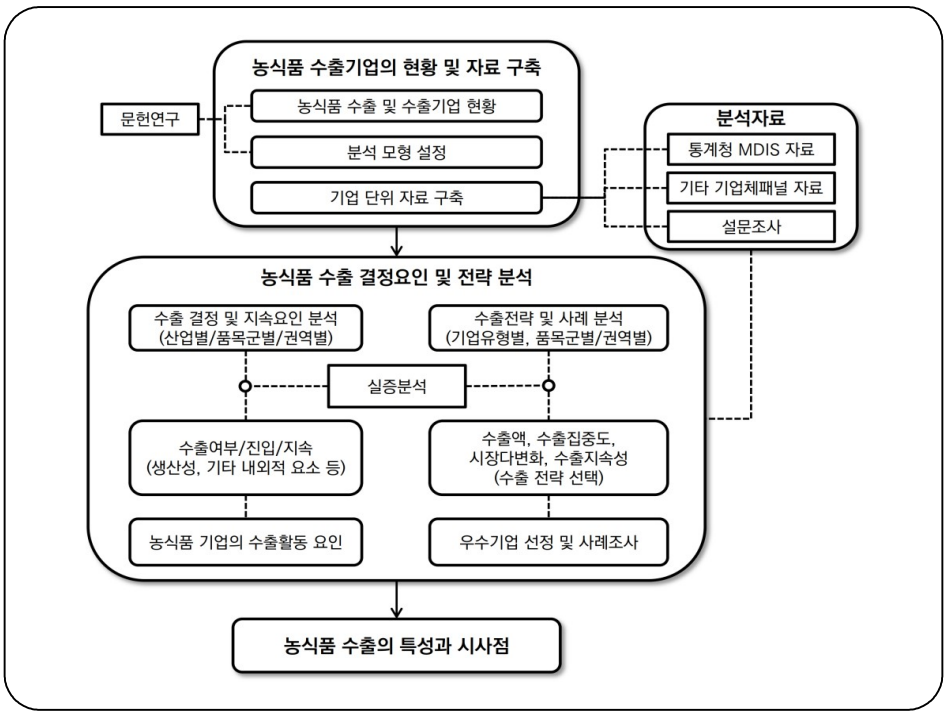
This study targeted small and medium size agri-food firms as the major subjects for analysis among the various types of agri-food exporters. However, analysis of determinants for exports and some areas of export sustainability were hampered due to the limited availability of useful statistics. The target agri-food firms are thus limited to companies in the categories of food and beverage manufacturing from the secondary classification of Korean Standard Industrial Classification. In addition, when analyzing the sustainability for microscopic export routes and export strategies, there are many small and mid-size agri-food exporters being excluded from surveys of business activities.

The major contents of our analysis are as follows. First, the factors determining entry into the export market, being liquidated from the market, and being sustained or not were analyzed for all the agri-food firms, Then the performance factors were analyzed for the exporters. The various indexes including export value, export intensity, export sustainability, and

market diversification were used to gauge export performance. Furthermore, we investigated the performance factors for agri-food exporters by type to highlight any different points. This study overcomes the limitations of previous quantitative analyses by using case analysis and surveys, and then developing strategies for the exporters based on type of export and policy issue.

The following are included in this report in detail. First, the current status of agri-food exporters is analyzed. The exporters' distribution by scale and characteristics together with the current status of the entire export of agri-food industry is identified. Then the overall situation compared to other industries is explained. Second, empirical analysis on the determinants for exports of agri-food firms is conducted. Specifically, this section analyzes what kinds of characteristics are critical for companies among the agri-food firms entering into the export market. The study also analyzes sustainability after entering the export market by focusing on the relationship between productivity and agri-food firms export activity. Third, factors for previous exporters that have effects on expansion of exports and new market development were analyzed using various indexes including export value, export intensity, market diversification, and export sustainability. Fourth, the relationship between export strategy and export performance of agri-food firms is analyzed. Companies were classified by export items, scale, and production method using the survey data. Strategic characteristics by firm type were also analyzed. In addition, the strategies that have effects on the unit export performance by item group and area from the perspective of intensity of export were also investigated. Lastly, this study proposes necessary policy directions to enhance the competitiveness of agri-food firms and improve export support programs based on the results of analysis.

<Figure 1-2> Research scope and working system



Source: Author generated.

3.2. Method of Research

This study utilized various methods including literature review, statistical analysis, econometric analysis, surveys, interviews, and expert consultation. After reviewing the precedent studies on determinants for export activity and performance, the theoretical and empirical background of this study is presented. In addition, the current status of South Korean agri-food exports is reviewed by analyzing the current status of agri-food firms.

Next, the statistical data are collected and analyzed. How various business characteristics and the inside and outside environmental changes have effects on the determinants of export activity and export performance is analyzed by using Statistics Korea's MDIS survey of business activities

(released each Year), aT's export support program's performance data, and so forth. This study analyzes the relationship between export strategies by firm type and export performance through the agri-food firm surveys.

In order to qualitatively complement the results of our analysis, research, and empirical analysis, expert consultation and interviews were conducted. Opinions on our research model and survey questionnaires from outside professionals were reviewed and reflected in the research. Interviews focusing on members of the companies with the best practices among the survey respondents were also conducted thus complementing our empirical analysis.

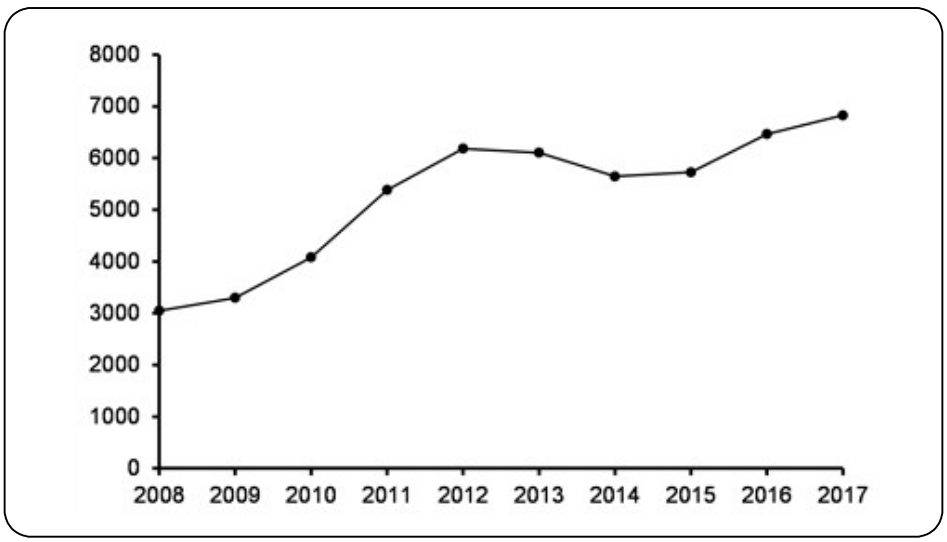
Chapter 2. STATUS OF AGRI-FOOD EXPORTERS

1. Trend of Agri-food Export

The value of South Korea's agri-food exports for 2015~2017 averaged US$6.46516 billion a year, but was continuously increasing over those 3 years. The value of 2017 exports was US$6.82649 billion, which is an increase of 124% compared to that of 2008, 10 years ago.

<Figure 2-1> Trend of Agri-food Export

unit: US$ mil



Source: Written by the author based on the data from KATI (www.kati.net: 2018. 8. 20.)

During the 2015~2017 period, South Korea's major export countries included Japan, China, USA, UAE, and Vietnam. The export value from these 5 countries accounted for approximately 57.6% of the entire export value. For exports in 2008, the top 5 export destination countries included Japan, China, USA, Russia, and Hong Kong. Thus there are some differences in the export portion by countries but it is safe to say that the major export markets have not changed much. The number of agri-food export destination countries was 181 in 2008 and expanded to 206 in 2017.

<Table 2-1> Agri-food export value by countries

unit: US$ mil

	2009	2011	2013	2015	2016	2017	2015~2017 Average
Japan	846	1,381	1,168	1,287	1,159	1,314	1,253
China	419	915	1,047	948	1,097	986	1,010
the US	338	419	627	523	716	746	662
UAE	158	189	334	188	414	447	350
Vietnam	87	214	371	354	403	375	377
Other countries	1,450	2,266	2,557	2,425	2,676	2,958	2,686

Source: Written by the author based on the data from KATI (www.kati.net: 2018. 8. 20.)

In 2015~2017, Korea's major export items were cigarettes, other confected agricultural products, confectionery, noodles, and liquors, with cigarettes and processed food accounting for a large portion of the export value. Compared with the 2008~2010 average, the major export items were similar while beverages and other confected agricultural products had grown the most as a proportion of all agri-food exports.

<Table 2-2> Trend for major export items and their changes

unit: US$ mil.

	2008~2010 Average			2015~2017 Average		
Rank	item	Export value	portion	item	Export value	portion
1	cigarettes	495	14.2	cigarettes	1,046	16.2
2	Other confected agricultural products	326	9.4	Other confected agricultural products	926	14.3
3	liquors	264	7.6	confectionery	438	6.8

(continued)

	2008~2010 Average			2015~2017 Average		
Rank	item	Export value	portion	item	Export value	portion
4	confectionery	263	7.6	noodles	418	6.5
5	vegetables	254	7.3	liquors	382	5.9
6	noodles	216	6.2	vegetables	331	5.1
7	sugars	215	6.2	beverages	325	5.0
8	coffee	206	5.9	fruits	274	4.2
9	fruits	174	5.0	sugars	272	4.2
10	sauces	120	3.5	coffee	272	4.2
others	other agri-food	944	27.1	other agri-food	1,781	27.5

Note: The AG code's secondary classification is applied for classifying the items. The other agri-food implies the item with outside the rank of 10^{th}.

Source: Written by the author based on the data from KATI (www.kati.net: 2018. 8. 20.).

2. Status of Exporters

The Statistics Korea's trade statistics by corporate characteristics with business unit survey data and aT's export support program's performance data[6] were used to examine the current status of agri-food exporters. The trade statistics by corporate characteristics are the trade data, in which Korea Customs Service and Statistics Korea aggregated the companies based on export performance after reconciling the list of companies based on the administrative statistics of company life cycle and the list of trade based on the import & export report, and then for the companies with export performance. This provides information such as number of exporters by corporate characteristics, value of import and export, trade balance, and so forth. However, it has a limitation on identifying the current status of exports by agri-food firms and exporters since the range of industry type is not revealed in detail. Thus the aT's support data was used as a supplement for examining the current status of export for agri-food firms and exporters.

[6] aT internal information.

2.1. Trade statistics by corporate characteristics

According to trade statistics by corporate characteristics, the number of exporters for F&B manufacturing (food and beverage manufacturing) was 1,500 with an export value of approximately US$3.257 in 2016. The number of exporters and export value for food manufacturing in 2016 had increased by 32.1% and 11.5% respectively compared to that from 2010. The number of exporters for beverage manufacturing was 125 in 2016, the same as that for 2010; whereas the export value had increased by 4.7%. The export value per company for food and beverage manufacturing was between US$2 ~3 million. The value for food manufacturing in 2016 compared to that for 2010 had decreased by 4.3% whereas that for beverages manufacturing had increased by 4.7%. The number of exporters and the export value for agriculture, forestry and fishery industries were respectively 91 and US$149 million in 2016. Compared to 2010, the number of companies and the export value had decreased by 11.7% and 45.4% respectively. The export value per company had decreased by 38.2% from US$2.7 million in 2010 to US$1.6 million in 2016.

<Table 2-3> The number of exporters and export value for F&B and agriculture

unit: # of unit, US$ mil., %

Industry type	Number of companies(#)			Export value(US$ mil.)		
	2010	2016	Rate of change	2010	2016	Rate of change
computer industry	81,102	93,045	14.7	465,123	494,281	6.3
Manufacturing	34,964	40,078	14.6	397,202	418,578	5.4
F&B and cigarettes manufacturing	1,169	1,504	28.7	3,492	4,300	23.1
food manufacturing	1,041	1,375	32.1	2,642	2,946	11.5
beverage Manufacturing	125	125	0	297	311	4.7
cigarettes manufacturing	3	4	33.3	553	1,043	88.6
agriculture, forestry and fishery	103	91	-11.7	273	149	-45.4

Source: Statistics Korea trade statistics by corporate characteristics (http://kosis.kr: 2018. 1. 29.).

In examining F&B and cigarettes manufacturing by employment scale in 2016, 72.9% of the exporters falls under the 1~9 and 10~49 scales, 21.4%

were at the 50~249 scale, and 5.7% were over 250 in scale. Compared to 2010, the export value per company for 1~9 and 10~49 had decreased by 22.3% and 12.3% respectively, whereas that for 50~249 and over 250 had increased by 1.3% and 15.6% respectively.

<Table 2-4> Number of companies and export value by industry and employment scale

unit: # of unit, US$ mil., %

Industry type	Employment scale	Number of companies(#)			Export value(US$ mil.)		
		2010	2016	Rate of change	2010	2016	Rate of change
computer industry	total	81,102	93,045	14.7	465,123	494,281	6.3
	1~9	52,155	58,660	12.5	24,776	24,768	0
	10~49	20,412	24,051	17.8	26,525	28,673	8.1
	50~249	6,950	8,366	20.4	49,440	52,380	5.9
	Over 250	1,585	1,968	24.2	364,382	388,460	6.6
General Manufacturing	total	34,964	40,078	14.6	397,202	418,578	5.4
	1~9	15,121	17,315	14.5	4,995	4,417	-11.6
	10~49	13,223	15,122	14.4	13,955	15,588	11.7
	50~249	5,462	6,289	15.1	38,462	40,968	6.5
	Over 250	1,158	1,352	16.8	339,791	357,605	5.2
F&B and cigarettes manufacturing	total	1,169	1,504	28.7	3,492	4,300	23.1
	1~9	432	515	19.2	122	113	-7.4
	10~49	427	582	36.3	272	325	19.5
	50~249	229	322	40.6	486	692	42.4
	Over 250	81	85	4.9	2,613	3,170	21.3

Source: Statistics Korea by corporate characteristics trade statistics (http://kosis.kr: 2018. 1. 29).

94.1% of the exporters for the F&B and cigarette manufacturing are SMEs while the export value of these companies accounted for 25% of the entire F&B and cigarette manufacturing export value. The number of conglomerates and strong medium-sized enterprises accounted for 1.9% and 4% of the entirety respectively, while their export value accounted for 37.5% each. The share of export value for SMEs and strong medium-sized enterprises compared to the manufacturing average is relatively high whereas that for conglomerates is low.

<Table 2-5> Number of companies and export value (2016) by industry and employment scale

unit: #, US$ mil.

Industry type	Scale of company	Number of companies	Export value	Export value per company
computer industry	Total	93,045	494,281	5.3
	Conglomerate	796	317,093	398.4
	Strong medium enterprise	1,689	85,137	50.4
	SMEs	90,560	92,052	1
General Manufacturing	Total	40,078	418,578	10.4
	Conglomerate	367	286,625	781
	Strong medium enterprise	1,189	76,385	64.2
	SMEs	38,522	55,568	1.4
F&B and cigarettes manufacturing	Total	1,504	4,300	2.9
	Conglomerate	29	1,611	55.6
	Strong medium enterprise	60	1,612	26.9
	SMEs	1,415	1,077	0.8

Note: The scale of company is classed by the average turnover, total assets, and independence standards for SMEs and strong medium enterprises by industry specified in the Minor Enterprises Act and Strong Medium Enterprises Act (Korea Customs Service and Statistics Korea 2017. 12. 26. press release).

Source: Statistics Korea trade statistics by corporate characteristics (http://kosis.kr: 2018. 1. 29.).

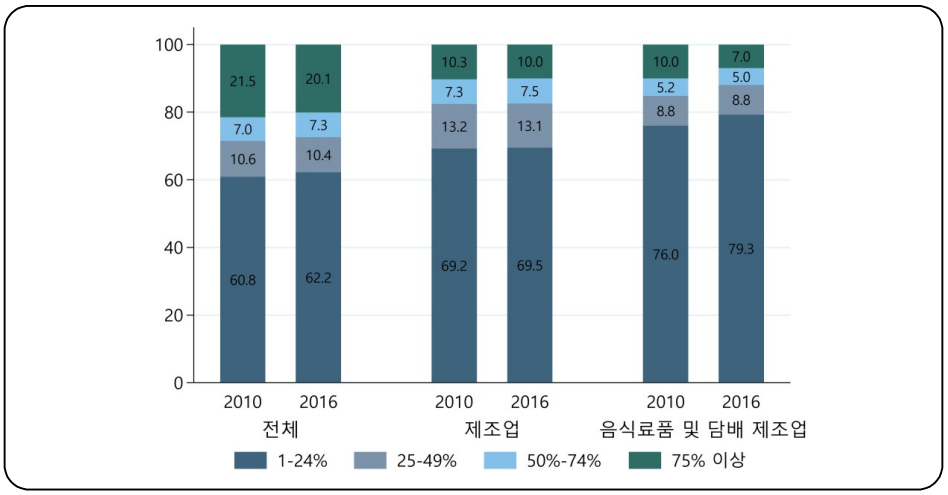
In examining the agri-food exporters component ratio (2016) by intensity of export[7], the share of F&B and cigarette manufacturers with 1~24% intensity of export was higher than the general manufacturing, while the share of the companies with the over 75% of intensity of export was relatively low at 7%. Compared to 2010, the share of companies with 1~24% intensity of export had increased whereas that of 75% intensity companies had decreased <Figure 2-2>.

The share of export value by intensity of export for the F&B and cigarette manufacturing industry is as follows <Figure 2-3>. The share components for the entire industry or general manufacturing had shown differences. For F&B and cigarette manufacturing industry, the companies

7 The intensity of export implies the share of export value compared to the relevant turnover.

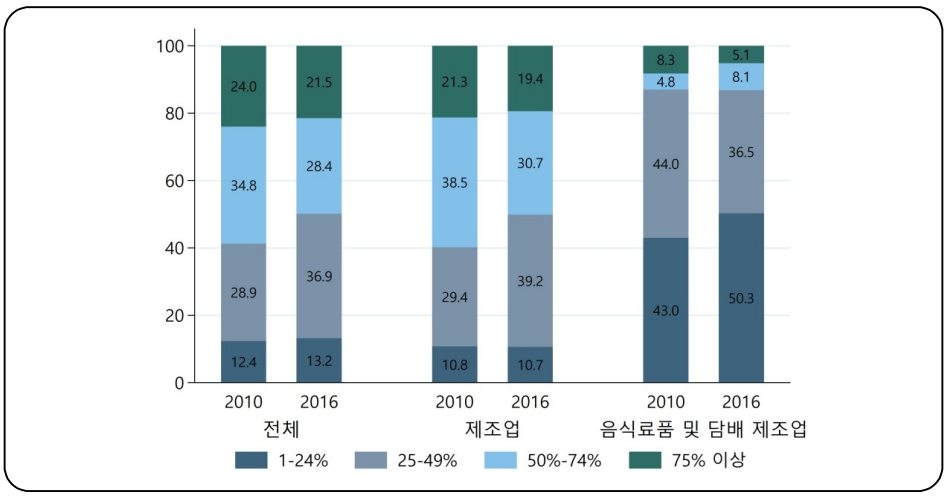
with 1~24% of intensity of export were the largest portion of the export value, while the companies with the 25~49%, 50%~74%, and over 75% in order had the higher export value. In addition, the F&B and cigarette manufacturing exporters with 1~24% intensity of export in the share of export value in 2016 had increased compared to that in 2010.

<Figure 2-2> Component ratio for agri-food exporters by intensity of export



Source: Statistics Korea trade statistics by corporate characteristics (http://kosis.kr: 2018. 1. 29.).

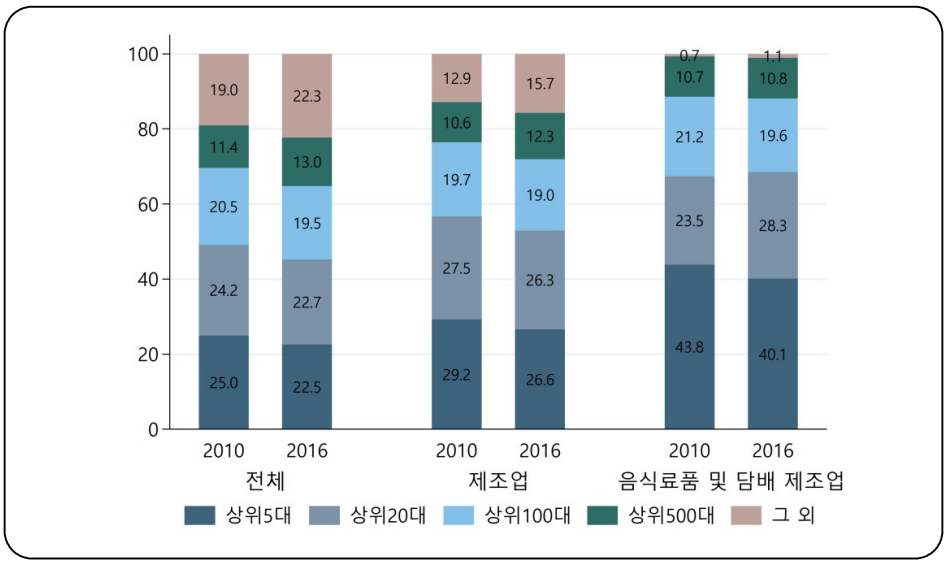
<Figure 2-3> Share of export value for agri-food exporters by intensity of export



Source: Statistics Korea trade statistics by corporate characteristics (http://kosis.kr: 2018. 1. 29.).

The export of F&B and cigarettes manufacturing industry is concentrated in on the top 5 enterprises. Additionally, the level of export concentration in these top 5 enterprises is relatively high compared to that of the average manufacturing industry. The level of trade concentration by top enterprises during the years from 2010~2016 has not changed much and it was found that the top 100 companies accounted for the majority of the export value <Figure 2-4>.

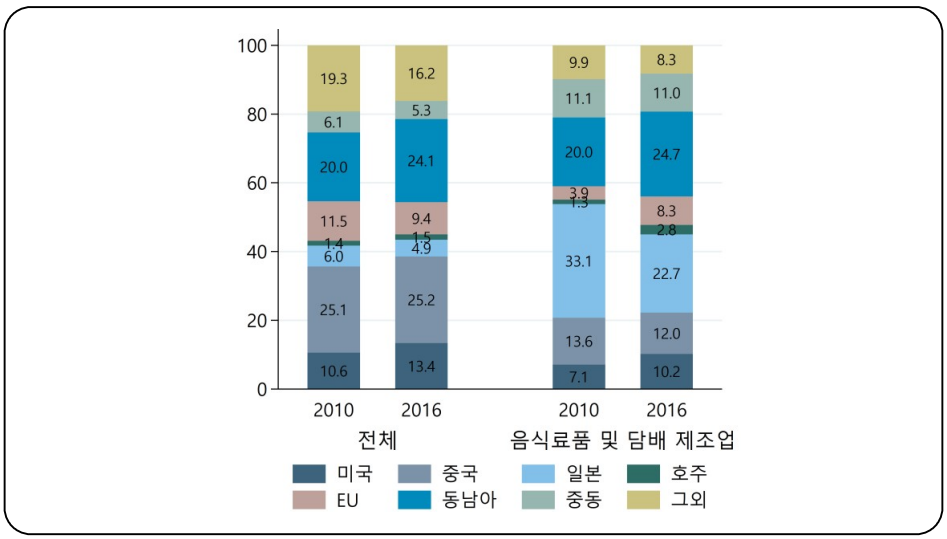
<Figure 2-4> Top agri-food firms level of trade concentration(export)



Source: Statistics Korea trade statistics by corporate characteristics (http://kosis.kr: 2018. 1. 29.).

When examining the share of export value by the major F&B and cigarettes manufacturing countries, this was found to be concentrated in Japan compared to that of general industry. However, in 2016, as compared to 2010, the exports had expanded to South East E. Asia countries and EU nations together with the increased share for the US easing off the export concentration previously seen in Japan <Figure 2-5>.

<Figure 2-5> Changes in share of export value by major F&B and cigarettes manufacturing countries



Source: Statistics Korea trade statistics by corporate characteristics (http://kosis.kr: 2018. 1. 29.).

2.2. Performance data for export support programs

In the Korea Agro-Fisheries & Food Trade Corporation (aT) export support program's performance data, the current status of support by company and export related information are being recorded.[8] The performance data of 2011~2016 are used in this section. The support performance data contains not only the export the value by exporters but also the export items (HSK 10 class) and export destination countries, thus leading to further ex-

[8] The agri-food logistics support program mainly by aT was a support program for the purpose of supporting partial expenses when exporting agri-food, which requires high logistics costs including packaging and transportation, to promote vitalization of export and to increase income for farm households. The more details can be found in the website 'Government 24'(https://www.gov.kr/: 2018. 5. 5.), and aT's export support system (http://atess.at.or.kr/: 2018. 5. 5.).

amination on the trend of item diversification of business units or export market diversification. However, the export value also included the logistics support costs so the actual export value for the product may be different from the data reported. Therefore, when analyzing the data changes in the export items and the number of export destination countries are more appropriate to examine than the export value.

The number of companies that received support for annual operating expenses during the period of 2011~2016 was between 250~300, whereas the 309 companies received support for operating expenses in 2016. The enterprises exported 124 items to 65 countries in 2011 whereas they exported 211 items to 85 countries in 2016. Thus we observed that Korea's agri-food exporters had expanded both their export markets and the number of items. The number of export countries by company averaged 3.8 in 2011 and 3.9 in 2016 respectively, suggesting little change, making them with little change, but the standard deviation between companies had expanded from 4.1 to 4.8. The number of average export items in 2011 was increased to 3.9 while the relevant standard deviation was also expanded from 4.1 to 5.4.

<Table 2-6> Trend of changes in export countries by company and number of export items

unit: # of unit

Year6	Number of companies	Number of countries	Number of items	Average number of export destination countries per company	Average number of items per company
2011	273	65	124	3.8	3.2
2012	257	63	122	3.6	3.2
2013	251	63	138	3.7	3.2
2014	266	69	172	3.7	3.8
2015	258	75	181	4	3.7
2016	309	85	211	3.9	3.9

Source: Written by the author based on the data from aT's export support program's performance.

The major export destination countries (based on export value in US$) of agri-food exporters included Japan, China, Taiwan, the USA, Vietnam, and Hong Kong, while the number of export items to each country had in-

creased over time. <Table 2-7>. The number of export items to Japan increased from 68 in 2011 to 87 in 2016. Kimchi, paprika, and lily (cut/fresh) the top export items. The number of export items to China increased from 21 in 2011 to 55 in 2016. The major export items to China changed from red ginseng, citrus tea, and orchid (mountain plants) in 2011 to citrus tea, milk, cream, and condensed milk in 2014. The number of export items to Taiwan increased from 37 in 2011 to 63 in 2016 and while the top export items are red ginseng, pears, and feathers. The export value of cabbages (fresh, refrigerated) had increased since 2015 to become a major export item. The number of export items to the US increased from 42 in 2011 to 84 in 2016 and the top export items were pears ('Singo' and others) and winter mushrooms (fresh/refrigerated). The number of export items to Vietnam increased from 39 in 2011 to 77 in 2016 and livestock products were the main exports. Chicken (frozen), chicken wings (frozen), and feathers were the top export items. , Additionally

Powdered milk (for baby/retails) became a major export item since 2014. The number of export items to Hong Kong increased from 53 in 2011 to 98 in 2016. The top export items had been strawberries (fresh), red ginseng, citrus tea. The export value of strawberries increased a great deal since 2013.

<Table 2-7> Trend of changes in the number of export items by export destination country

unit: Number of items

Country	2011	2012	2013	2014	2015	2016
Japan	68	69	67	86	78	87
China	21	22	27	43	46	55
Taiwan	37	41	39	48	50	63
the US	42	45	45	63	74	84
Vietnam	39	38	41	50	54	77
Hong Kong	53	56	71	75	76	98
Average	13.5	11.9	12.7	14.7	14.6	15

Note: The major export countries were selected as countries ranked top 5 in export value for the period of 2011~2016 while the order was based on the export value in 2016.

Source: Written by the author based on the data from aT's export support program's performance.

The number of export countries by category of export item has either decreased or stayed steady by and large. The categories with high level of hygiene and quarantine requirements such as fruits and livestock products did not show much of change in the number of countries. The major tea export items for the exporters, who received the logistics expenses support, were green teas or tea bags contained grains. The number of export countries expanded from 4 countries in 2011 to 22 countries in 2014, but this decreased to 16 countries in 2016. The category that experienced the greatest increase in the number of export countries was vegetables, and the specific items impacted were mainly paprika, strawberries, mushrooms (winter mushrooms and king oyster mushrooms). These exports expanded from 46 countries in 2011 to 63 countries in 2016.

<Table 2-8> Trend of changes in number of export destination countries by category

unit: Number of countries

export item category	2011	2012	2013	2014	2015	2016
grains	-	-	-	-	11	14
fruits	37	38	36	35	35	40
other processed	-	-	-	-	-	20
Kimchi	31	29	30	33	38	40
processed rice	16	1	1	7	11	12
ginseng	42	42	42	41	44	51
traditional liquor	26	25	24	28	28	29
tea	4	10	18	22	17	16
vegetables	46	38	37	44	52	63
livestock products	17	15	14	14	15	18
flowers	18	18	15	14	21	19
Average	26.3	24	24.1	26.4	27.2	29.3

Note: It includes the information based on aT's supported items or the categories item being supported only. The others processed food was included as a subject for the support program in 2016.

Source: Written by the author based on the data from aT's export support program's performance.

3. Main Contents and Characteristics

The export value for Korean agri-food has been increasing, as has the diversity of export destination countries. However, the exports are concentrated in major export countries such as Japan, China, the US, UAE, and Vietnam. In terms of export destination country, the number of countries has increased by about 14% compared to 2008 and the share of beverage and other confected agricultural products has increased a great deal.

In examining the current status, of exporters, the number of exporters in F&B (food, beverages) manufacturing increased 29% to 1,500 and the export value increased 11% compared to 2010. If the cigarette manufacturing were also included, the export value would have increased about 23%. It is mainly because cigarette exports have dramatically increased for the past 10 years by approximately 89%.

When examining the corporate characteristics, we find that 94.1% of the F&B and cigarette manufacturing exporters are SMEs accounting for 25% of the relevant industries' export value. The share of SMEs' export value is relatively high compared to that in general manufacturing but the export value per company is fairly low. The share of export value for the F&B and cigarette manufacturers with 1~24% intensity of export (export value/turnover) is higher than in general manufacturing. The share of export value for the companies with over 75% intensity is lower than the general manufacturing average. By expanding the export of F&B and cigarettes manufacturing to the US, EU, and SE Asia, the industry's dependency on exports to Japan has decreased compared to 2010.

According to the aT's export support program's performance data, the number of export countries and export items has continuously expanded while the major export items have varied depending on the country. The top export items to Japan have consistently been Kimchi, paprika, and lily. While the top export items to China have changed from red ginseng to citrus tea, and other dairy products. The major export items to Taiwan were red ginseng, pears. While pears, winter mushrooms, and so forth e were the top for the US and, frozen chickens, powdered milk were the major export

to Vietnam., While strawberry, red ginseng, citrus tea were the major exports to Hong Kong.

The number of export destination countries for Korean agri-food has constantly expanded over the past 10 years. Japan, China, and the US have been the major export destination countries. However, it the export market has recently diversified by expanding to the Middle East (UAE, and etc.) and S.E. Asian markets (Vietnam, and etc.). This diversification has decreased the export dependency on the Japan market. The major export items have not changed much in terms of their export order in share, although they may be varied depending upon the export destination country.

A strategy targeting a certain item does have advantages for putting all competencies in one spot, risk diversification by diversification of export items is advisable considering the fact that overreliance on certain items creates difficulties in dealing with a changing environment in the export destination country. For instance, it became difficult to export red ginseng products to the relevant countries due to China's own domestic production and consumption, S.E. Asian countries (Indonesia and etc.)' more complicated quarantine, and so forth. It is therefore necessary to embrace an export diversification strategy to expand the types of items in conjunction with a market diversification strategy to expand export destination countries for stable export expansion.

Chapter 3. DETERMINANTS FOR EXPORT OF AGRI-FOOD FIRMS

1. Determinants for Exports

1.1. Introduction and method of analysis

According to the previously reviewed new trade theory, a company decides to enter an export market, the sunk cost, which occurs when entering export markets, becomes an important criterion (Roberts and Tybout 1997). Therefore companies enter export markets with self-selection as per their respective productivity level (Melitz 2003).

Empirical analysis of these trade theories primarily relies on manufacturing business unit survey data to statistically and econometrically examine whether a company with high productivity enters export markets.[9] This study also follows the precedent studies and uses the Statistics Korea MDIS's 'survey of business activities' for the analysis. The survey of business activities publicly announced annually by the Statistics Korea since 2006 is comprehensive data with complete enumeration of all companies with over 50 employees and budgets of KRW 300 million that are conducting industrial activities in Korea.

In order to compare the determinants for exports of food industry and manufacturers, the food industry was limited to food and beverage manu-

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[9] Bernard and Jensen(1999), Arnold and Hussinger(2005) analyzed German, Kim et al.(2009) for Korea, Todo(2011) for Japan.

facturing under the industrial type classification while non-food manufacturing was specified as general manufacturing excluding the food industry. In the precedent studies, cigarette manufacturing was usually included in the agri-food industry but it was excluded in this study due to the fact that KT&G is dedicated to production and export cigarettes and has very different characteristics from other F&B products.[10]

Since "whether to export" can be displayed as 1 or 0, the Probit or logit models can be used for estimation. It is possible to estimate a company with unconditional fixed-effects logit including the dummy company. However, it is likely that bias will take place due to the incidental parameter. This is a problem for when the duration of data (T) is shorter than the number of panels (N) as this survey of business activities. The logit (conditional fixed-effects logit) does have disadvantages in reflecting endogeneity as it is hard to estimate average marginal effect (AME).

The panel Probit model used in this study can be shown as the following formula (1). Since the data is panel type, c_i, the time-invariant variable involving heterogeneity among the unobserved companies is included in order to consider the heterogeneity of the company in this model. The following model allows dependent variables as 0 and 1, or any kind of ratio type value between 0 and 1. The Φ here implies the cumulative distribution function of standard normal deviate.

$$E(y_{it}|x_{it},c_i)=\Phi(x_{it}\beta+c_i),\quad t=1,\cdots,T;\quad y\in[0,1] \tag{1}$$

The dependent variable (y_{it}) includes whether to export during the term t. The explanatory variable (x_{it}) includes index (# of employees, and etc.) indicating company scale, # of business year, productivity index (labor productivity, total factor productivity, etc.), industry, region, and dummy variable to consider invariant characteristics of year are included. When the c_i distribution satisfies the conditional normal distribution assumption ($c_i|(x_{i1},x_{i2},\cdots,x_{iT})\sim N(\psi+x_{it}\beta+\bar{x}_i\zeta),y\in[0,1]$) and exogenous assumption, the reduced

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[10] For the case where the food industry included the cigarettes manufacturing, very similar result from the analysis of this study was drawn.

form will be as the formula (2).

By including time average variable ($\overline{x_i}$) of panel unit, we can estimate the conditional average as the following.

$$E(y_{it}|x_{it}) = \Phi(\psi_t + x_{it}\beta + \overline{x}_i\zeta), \quad y \in [0,1] \tag{2}$$

Considering heteroscedasticity and serial dependence, which may exist due to the panel data's characteristics, the consistent estimator can be estimated by quasi-maximum likelihood estimation (QMLE) by following Papke and Wooldridge (2008). For more convenient interpretation, the average marginal effect (AME) is estimated since the estimated coefficient cannot be interpreted as a marginal effect (changes in dependent variables on the changes in 1 unit of explanatory variable) being different from the linear model. If the k^{th} explanatory variable is a continuous variable, the average marginal effect will be estimated as the formula (3). The $\phi(\cdot)$ here implies the standard normal deviate probability density function.

$$AME_k = N^{-1}\sum_{i=1}^{N}\hat{\beta}_k\phi(\hat{\psi} + x\hat{\beta} + \overline{x}_i\hat{\zeta}) \tag{3}$$

If the k^{th} explanatory variable is a binomial variable, the average marginal effect will be estimated as the formula (4). subscript (k) implies the vector of explanatory variables excluding the k^{th}.

$$AME_k = N^{-1}\sum_{i=1}^{N}\left[\hat{\beta}_k\phi(\hat{\psi} + \hat{\beta}_k x_{it(k)}\hat{\beta}_{(k)} + \overline{x}_i\hat{\zeta}) - \phi(\hat{\psi} + x_{it(k)}\hat{\beta}_{(k)} + \overline{x}_i\hat{\zeta})\right] \tag{4}$$

1.2. Estimation of productivity

In this section, the productivity of a company, which is a major variable of the model, is estimated. The self-selection and learning by exporting effects, which are the major theories regarding productivity and export activ-

ities, are analyzed by comparing the productivity distribution. The total factor productivity (TFP) and labor productivity can be considered as indexes to estimate company productivity. The total factor productivity is estimated by assuming Cobb-Douglas' production function using the Levinsohn and Petrin (2003) method.[11] In the production function of formula (5), v, l, k, and m implies added value, input labor, input capital, and input materials with logs taken for all and respectively. The ω implies the total factor productivity of k and m's function, the μ means the error term that is not correlated to input selection. The labor and materials are considered as freely variable inputs whereas capital is considered as a state variable. The materials input is used as a proxy variable for productivity impact. The total factor productivity (TFP) can be estimated using the formula in figure 6 through the coefficient estimated by the formula in figure 5.

$$v_t = \beta_0 + \beta_l l_t + \beta_k k_t + w_t(k_t, m_t) + \mu_t \quad (5)$$

$$\widehat{TFP}_t = \exp(\hat{\omega}_t) = \exp(v_t - \hat{\beta}_l l_t - \hat{\beta}_k k_t) \quad (6)$$

The added value among the variables used to estimate the total factor productivity is calculated by adding up operating income, labor income, depreciation cost, rent, and taxes and dues as in the formula in figure 7 in accordance with the method specified by the Korea Productivity Center (2017: 55). Labor input is calculated as the number of fully employed workers multiplied by the monthly average labor time for the industry, while tangible assets are used for capital input. In addition, material cost from the expense list is used for the materials. Production related variables are materialized by the GDP deflator by economic activity, while capital and investments related variables are materialized by the capital expenditure deflator of gross fixed capital formation. Labor productivity can be displayed as added value per laborer and calculated as the formula in figure 8.

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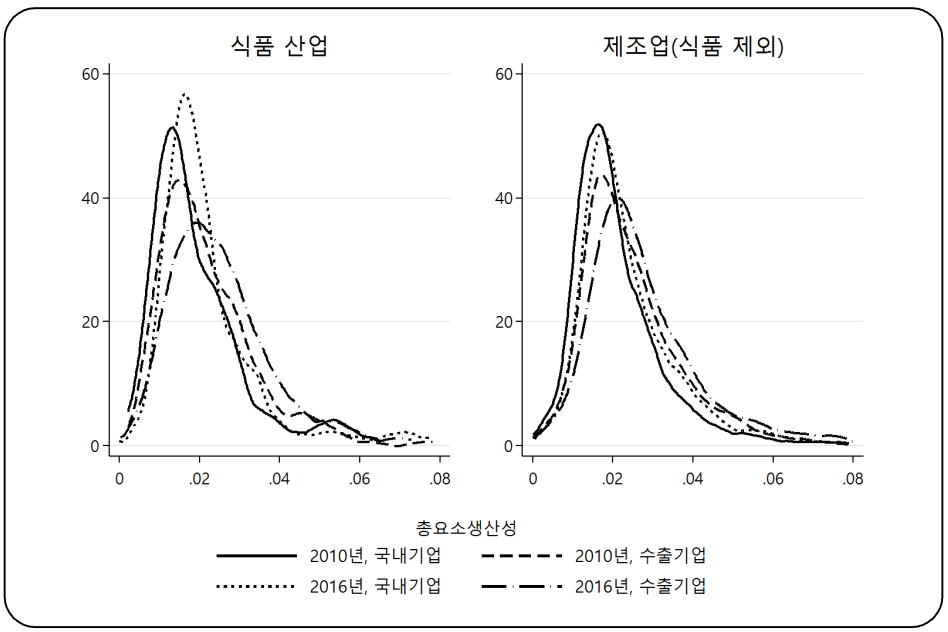
[11] In the Levinsohn-Petrin method, materials are used as proxy variables in order to solve the issue of endogeneity between input components and the total factor productivity. In his study, the material costs are used as proxy variables.

Added Value (v) = operating profits + income to labor + depreciation + rent + taxes & dues (7)

Labor productivity = add value / the number of employees (8)

After estimating the total factor productivity and labor productivity for the food (F&B Manufacturing) and non-food manufacturers, it was found that the productivity mode for the exporters was higher than for the domestic companies. Additionally, the exporters have thicker distribution of the companies with higher productivity (right side of x-axis) <Figure 3-1>. A side-by-side comparison of 2010 and 2016 showed that the productivity distribution shifted to the right overall so the productivity for both domestic companies and exporters increased compared to 2010. The outline of distribution for the agri-food industry is rough thus making it difficult to identify by the picture, but the difference in productivity distribution for domestic companies and exporters of manufacturing in 2016 compared to 2010 can be clearly observed.

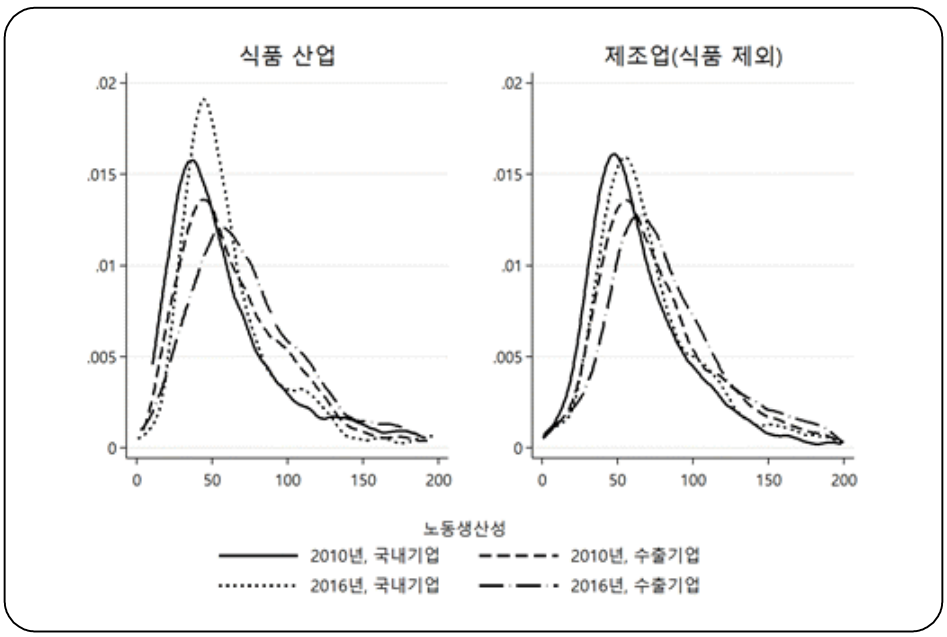
<Figure 3-1> total factor productivity distribution by industry



Source: Author generated

By comparing the exporters and domestic productivity of company distribution by labor productivity, the difference in distribution was clearer. This showed a similar pattern to the previously examined distribution difference of total factor productivity (Picture 3-2).

<Figure 3-2> Labor productivity distribution by industry



Source: Author generated.

The Kolmogorov-Smirnov test, which is a non-parametric method, was used to analyze whether the difference in productivity distribution between exporters and non-exporters (other domestic companies) is statistically significant. The result of the Kolmogorov-Smirnov test showed that the productivity distributions for exporters and non-exporters in both general manufacturing and food industry are statistically different from one another (table 3-1).

Based on this result, it was found that the productivity distribution for Korean agri-food firms has statistically shown more apparent differences over time as whether to export. This may imply that it supports the self-se-

lection theory for which companies with differentiated heterogeneity (productivity) in the agri-food industry would participate in export.

<Table 3-1> gap of productivity distribution between exporters and domestic companies: Kolmogorov-Smirnov test

	Year	2010	2012	2014	2016
Test subject	industry	p-value	p-value	p-value	p-value
total factor productivity Rate of increase	Food	0.988	0.432	0.248	0.551
	Manufacturing	0.293	0.291	0.534	0.515
total factor productivity	Food	0.058	0.058	0.005	<0.001
	Manufacturing	<0.001	<0.001	<0.001	<0.001
Labor productivity Rate of increase	Food	0.367	0.582	0.460	0.294
	Manufacturing	0.205	0.117	0.244	0.270
Labor productivity	Food	0.149	0.125	0.007	<0.001
	Manufacturing	<0.001	<0.001	<0.001	<0.001

Source: Author generated.

However, the gap in the rate of productivity increase distribution between exporters and domestic companies for both general manufacturing and food industry was not found to be significant. This may imply that it does not support the learning by exporting theory which suggests companies in Korea's manufacturing industry increase productivity in order to improve competitiveness after entering export markets. A more detailed examination on this matter will be presented in the section on 'determinants for exports analysis.'

1.3. Determinants analysis

1.3.1. Analysis materials and explanation on variables

The company panel for 'survey of business activities' includes approximately 450 agri-food firms (entirety of about 12,000 companies) and about

150~200 agri-food firms (entirety of about 4~6 thousand companies) among them have export experience. During the period from 2006~2016, approximately 35~50% of the surveyed companies were conducting exports. This study utilized the data range from 2006~2016 for the analysis.[12]

<Table 3-2> Current status of the number of exporters and their share by industry (2006~2016)

subject		agri-food		Manufacturing (excluding agri-food)		Entirety	
		export	Entirety	export	Entirety	export	Entirety
2006	Number of companies	150	425	3,189	5,665	3,845	10,786
	portion(%)	35.3	100	56.3	100	35.6	100
2011	Number of companies	189	456	3,305	5,381	4,390	11,722
	portion(%)	41.4	100	61.4	100	37.5	100
2016	Number of companies	221	461	4,395	5,568	6,029	12,471
	portion(%)	47.9	100	78.9	100	48.3	100

Source: The author generated based on the MDIS (mdis.kostat.go.kr: 2018. 1. 10.~11. 3.) 'survey of business activities'.

The Probit function of the formula in figure 9 is used in the analysis, where the variables (x_3 , ..., x_k) such as whether to export (EX_{it-1}), productivity ($\ln TFP_{it-1}$), corporate characteristics (Scale, # of years for biz), externality of region or industry, and year dummy in the previous year are all considered. The dependent variable in the analysis is whether to export (EX_{it}) for company in t, whereas values of t-1 are used for the independent variables.

$$P(EX_{it}=1|EX_{it-1},\ln TFP_{it-1},x_3,\cdots,x_k) = \Phi(\psi_t+\beta_1 EX_{it-1}+\beta_2 \ln TFP_{it-1}+\beta_3 x_{3,it-1}+\cdots+\beta_k x_{k,it-1} +\zeta_1 EX_i+\zeta_2 \ln TFP_i+\zeta_3 x_{k,i}+\cdots+\zeta_k x_{k,i})$$

[12] In order to improve credibility of the analyzed results, the data of 5% from both extreme sides of turnover distribution are excluded. However, the data of entire companies is used for the statistics of parent group.

The independent variable and basic statistics used in this analysis are as shown in <Table 3-3>. The company's decision whether to export in the previous year is the proxy variable for fixed costs of entering export markets (quoted from Roberts and Tybout 1997; Bernard and Jensen 1999; Tybout 2001: 29), and it generally has positive (+) effects on the decision of whether to export (Bernard and Jensen 2004, etc.). The labor productivity and total factor productivity are used in the productivity studies depending upon the characteristics of the study and the materials, though different methods of estimation are used by researchers to determine the total factor productivity. In this analysis, the log-transformed value of the productivity estimate is used based on the method of Levinsohn and Petrin (2003). The analysis revealed that the productivity generally has positive (+) effects on export status (Bernard and Wagner 2001; Arnold and Hussinger 2005, etc.).

<Table 3-3> Determinants for exports analysis variables and basic statistics

	agri-food (N=584)				Manufacturing(excluding agri-food) (N=7,445)			
	Average	Standard deviation	Minimum value	Maximum value	Average	Standard deviation	Minimum value	Maximum value
whether to export	0.41	0.49	0.00	1.00	0.67	0.47	0.00	1.00
whether to export$_{t-1}$	0.39	0.49	0.00	1.00	0.64	0.48	0.00	1.00
ln(TFP)$_{t-1}$ (LP)	2.48	0.43	1.01	5.65	3.63	0.53	-5.53	3.87
ln(TFP)$_{t-1}$ (OP)	2.23	0.75	-5.95	4.99	2.34	0.69	-8.97	6.61
ln(Labor productivity$_{t-1}$)	4.03	0.70	-2.30	7.37	4.17	0.64	-4.14	9.35
ln(# of employees$_{t-1}$)	4.81	0.65	3.78	7.62	4.80	0.63	1.61	7.95
ln(# of years for biz$_{t-1}$)	2.83	0.69	0.00	4.30	2.86	0.61	0.00	4.57
Same industry outside the region$_{t-1}$	0.42	0.12	0.00	0.69	0.42	0.10	0.02	0.67
Different industry within the region$_{t-1}$	0.42	0.10	0.00	1.00	0.64	0.13	0.00	1.00
Same industry within the region$_{t-1}$	0.36	0.19	0.00	1.00	0.62	0.20	0.00	1.00

Source: The author generated based on the MDIS (mdis.kostat.go.kr: 2018. 1. 10.~11. 3.) 'Survey of business activities'.

The # of employees and # of years for business are a reflection of the basic characteristics of various companies. The # of employees as a proxy variable for corporate scale is information that can reflect low marginal cost, a company's sales and marketing competences, risk management capability, and systematization as per economies of scale (Wagner 1995: 33). Calof (1994: 369), who organized the studies on the corporate scale and decision to export, suggested that the scale does not have a positive (+) influence on the decision to export, or does not have any statistically significant effects. According to the explanation of Love et al. (2016), the # of years for business can relate not only to rigidity or inflexibility regarding export but also to the general international activity experience of a company from the standpoint of corporate management. The effect that the # of years for business had on the decision of export was negative (-) in Bagella et al. (2000) but positive (+) in Matteis et al. (2016).

The studies on externality of region and industry have been reviewed numerous times in the literature since late 1990, but the effect is still questionable (Greenaway and Kneller 2007: 143). These studies can be divided into the following: the studies regarding the effect of the multinational companies in the region and industry or overseas capital flows on decision of export (Aitken et al. 1997; Kneller and Pisu 2007); the study of analysis for the industry integration and decision of export of company (Bagella et al. 2000); and the study regarding the effect that other companies' activities in the same region and industry, where the company belongs to, on decision of export (Bernard and Jensen 2004; Greenaway and Kneller 2008). In this study, the three externality variables are introduced by referring to the study of Bernard and Jensen (2004). The three variables are divided into the same industry outside the region, different industry within the region, and the same industry within the region. They imply the share of the exporter in the relevant industry of a relevant region. The increase in share of the exporter in the same region or same industry leads to reduced export costs by sharing the infrastructure for export, logistics, information on export and risk, and thus it may have positive effects on the decision of export. On the other hand, if it is perceived as a competition, it will have negative effects on the decision of export.

1.3.2. Results of analysis

In order to compare food manufacturers and non-food manufacturers, an analysis of each company group was conducted and the analysis results are presented in <Table 3-4>.

It was found that the export experience in the previous year for both food and general manufacturer groups had positive effects on whether to export for the next year. In other words, a company that exported in the previous year has a higher chance to export (or be an exporter) in the next year as well. The average marginal effect did not have huge differences even though it appeared that the general manufacturing was slightly high.

In addition, if the productivity (total factor productivity and labor productivity) of the previous year is higher, it was determined that the possibility of decision to export in the next year is higher coinciding with the results of self-selection theory. Utilizing South Korean business data from 1996~2003, Kim et al. (2009) analyzed the determinants for exports. In Kim's study, the effect of productivity for the food and cigarettes industry was observed to not be significant, but it was observed to be significant in this study.

It has been observed that it is difficult to conclude that the bigger the scale of food company the more positive the effects, however, the scale of the general manufacturer did have positive (+) effect on decision to export. This can also be found in the studies of Wagner (1995), Bernard and Wagner (2001), and Arnold and Hussinger (2005). In the study by de Matteis et al. (2016), the number of years of being in business was found to have a positive (+) effect on decision to export.

The effect of externality for food companies did not have effects on the decision to export, but it was found that the same industry outside the region and different industry within the region for general manufacturing has a positive (+) effect on the decision to export. The analysis from Greenaway and Kneller (2008), which studied British companies considering the externality by using the same method as the above, had a similar result.[13]

It is very difficult to assertively interpret the effects of externality on the

decision to export. However, it seems that the externality of a company such as the export infrastructure, and share of information, which exist in the region or industry, has positive effects on the decision to export.

<Table 3-4> Food manufacturers and general manufacturers' determinants for exports

	(1)		(2)		(3)		(4)	
dependent variables: whether to export	Food		Food		Manufacturing (Excl. food)		Manufacturing (Excl. food)	
	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect
whether to export (t-1)	0.570[a]	0.108[a]	0.570[a]	0.108[a]	0.613[a]	0.121[a]	0.621[a]	0.122[a]
	(0.089)	(0.020)	(0.089)	(0.020)	(0.022)	(0.005)	(0.023)	(0.005)
ln(# of years for biz)(t-1)	0.698[a]	0.105[a]	0.717[a]	0.108[a]	0.210[a]	0.033[a]	0.259[a]	0.041[a]
	(0.263)	(0.040)	(0.261)	(0.039)	(0.080)	(0.013)	(0.080)	(0.013)
ln(# of employees) (t-1)	0.212	0.032	0.237	0.036	0.201[a]	0.032[a]	0.224[a]	0.035[a]
	(0.142)	(0.021)	(0.157)	(0.024)	(0.043)	(0.007)	(0.045)	(0.007)
Same industry outside of the area(t-1)	-0.732	-0.110	-0.719	-0.108	0.892[a]	0.141[a]	1.000[a]	0.156[a]
	(0.867)	(0.131)	(0.865)	(0.130)	(0.274)	(0.043)	(0.276)	(0.043)
Different industry within the area(t-1)	0.382	0.058	0.596	0.090	0.328[b]	0.052[b]	0.394[b]	0.062[a]
	(1.022)	(0.154)	(1.041)	(0.157)	(0.162)	(0.026)	(0.166)	(0.026)
Same industry within the area(t-1)	-0.253	-0.038	-0.155	-0.023	0.096	0.015	0.154	0.024
	(0.293)	(0.044)	(0.286)	(0.043)	(0.093)	(0.015)	(0.094)	(0.015)
ln(TFP)(t-1)	0.469[b]	0.071[b]			0.124[b]	0.020[b]		
	(0.195)	(0.029)			(0.051)	(0.008)		

13 In the study of Greenaway and Kneller (2008), it is analyzed that the increase in the share of exporters in the same industry outside the region, different industry within the region, and same industry within the region increased the possibility for decision to export by a company. But, in the study of Bernard and Jensen (2004), the effect of externality was not apparent or had negative (-) effects for the different industry within the region. Like such, the effects of externality may vary depending on the country and industry.

(continue)

	(1)		(2)		(3)		(4)	
dependent variables: whether to export	Food		Food		Manufacturing (Excl. food)		Manufacturing (Excl. food)	
	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect	Estimated coefficient	Marginal effect
ln(Labor productivity)(t-1)			0.186[b]	0.028[a]			0.055[b]	0.009[b]
			(0.090)	(0.0136)			(0.023)	(0.004)
Constant term	-1.846[a]		-1.966[a]		-2.130[a]		-2.185[a]	
	(0.354)		(0.364)		(0.102)		(0.110)	
Observed value	3565		3541		47737		46629	
Number of companies	584		582		7445		7378	
χ^2	2127.7		2066.9		26961.5		26148.7	
Prob. > F	<0.001		<0.001		<0.001		<0.001	

Note 1) The clustered robust standard errors and delta standard errors are presented in the parenthesis. Each A and b implies the significance level of 1% and 5% respectively.
2) The time-invariant characteristics including the corporate average variable and year dummy, and the exogenous impact at specific time are controlled.

Source: Author generated.

1.3.3. Effect of exports on productivity

In order to verify the learning by exporting effects for the companies that have entered into the export market, the Propensity-score matching (PSM) method was used (Abadie and Imbens 2016). The propensity score for starting export was obtained by using the explanatory variables (# of employees, # of years for biz, externality, year dummy, etc.) in the determinants for exports analysis and then the average treatment effect on the treated group was estimated. For drawing a more generalized result, the rate of increase for total factor productivity and labor productivity across various periods, such as last year~this year (t-1/t), last year~next year (t-1/t+1), last year~2 years later (t-1/t+2), last year~3 years later (t-1/t+3), and so forth, were estimated as conducted in the study by Manez-Castillejo et al. (2010).

As a result of our estimation, entering the export market did not have a

significant effect on the increase of productivity while it could not present the empirical result that South Korea's food companies and general manufacturers did have learning by exporting effects. Applying different periods for the rate of increase, the estimated result, in which the rate of increase for the total factor productivity and labor productivity is affected by entering export markets for food companies and general manufacturers, was not determined.

<Table 3-5> Effects of entering export markets on productivity: propensity score matching

	Rate of increase Duration	Food		Manufacturing(Excl. food)	
		ATET	N1 / N0	ATET	N1 / N0
total factor productivity Rate of increase	t-1/t	0.020 (0.042)	156 / 3,404	-0.017 (0.016)	2,050 / 44,727
	t-1/t+1	-0.027 (0.059)	139 / 2,867	-0.009 (0.019)	1,835 / 37,623
	t-1/t+2	-0.002 (0.063)	104 / 2,424	0.018 (0.023)	1,435 / 31,760
	t-1/t+3	-0.033 (0.067)	90 / 1,989	0.047 (0.024)	1,255 / 26,257
Labor productivity Rate of increase	t-1/t	-0.039 (0.046)	155 / 3,389	0.016 (0.017)	2,041 / 44,576
	t-1/t+1	-0.030 (0.054)	137 / 2,843	-0.011 (0.019)	1,822 / 37,439
	t-1/t+2	-0.099 (0.063)	103 / 2,399	0.004 (0.022)	1,422 / 31,547
	t-1/t+3	-0.062 (0.062)	89 / 1,966	0.024 (0.024)	1,241 / 26,049

Note 1) The propensity score for matching is estimated by using the explanatory variables (# of employees, # of years for biz, externality, year dummy, etc.) used in the determinants for exports analysis, and dummy dependent variables for start exporting based on the Probit model.

2) Each ATET, N1, and N0 means the average treatment effect on the treated group, observed value for the treated group, and observed value for the non-treated group, while each ATET's standard errors are displayed in the parenthesis.

Source: Author generated.

2. Export sustainability

Export sustainability (survival) implies how long a company, which has entered export markets, has conducted continuous export without stopping.

In the criteria for export sustainability, whether to export or to continue export routes can also be considered. For instance, examining for a company the number of years from the year it started exporting to the year it stopped exporting can be considered the export sustainability. In addition, if a company exported pears at a specific year from South Korea to the US, examining whether the pears have been continuously exported to the relevant market through later years can be considered the export route's sustainability.

In this section we identify the actual state of agri-food firms' export sustainability and examine the export activity further to determine whether it has been better from the aspect of quantity and quality over time. In addition, we then analyze the factors affecting export sustainability.

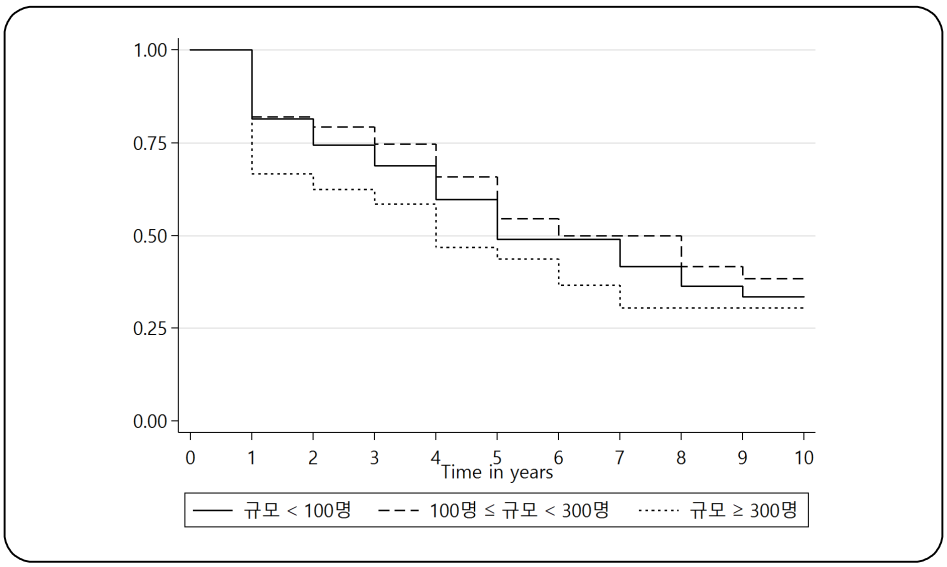
2.1. Analysis background

The total exports of a company can be increased by an increase of export volume (value) for existing items (intensity of export; intensive margin). Total exports may also be increased by exporting new items to existing markets or by penetrating new markets with existing items (degree of export diversification; extensive margin). Based on the results from precedent studies, export product diversification is a key reason for the increase of exports in the early stage of trade liberalization through WTO, FTA, etc., while the level of concentration has larger effects than that of diversification in the mid & long-term trade relationship. For Korea's agri-food exports, 15 FTAs have come into force from the first FTA (with Chile) in 2004 until the present. Since export policies have been focusing on export market diversification and export item diversification, exports have increased as the level of export diversification has increased. Therefore, improvement on intensity of exports should be the logical new focus, especially now that the major overseas market's tariff barriers have been removed and some time has passed.

2.2. Export sustainability analysis by industry

Before further examining the export sustainability of agri-food firms, this paragraph analyzes the corporate characteristics and features that affect the export sustainability for companies in the food industry and general manufacturing by using the 'survey of business activities'. Kaplan and Meier (1958) using the survival analysis estimated the number of continuing years after entering the export markets. By examining the survival function estimation result, it was found that food companies below the middle scale (100~300) had a higher rate of sustainability in most of the areas compared to companies in other scales. However, food companies in the 'over 300' scale have a tendency to dramatically decrease over the course of 4 years since starting exports.

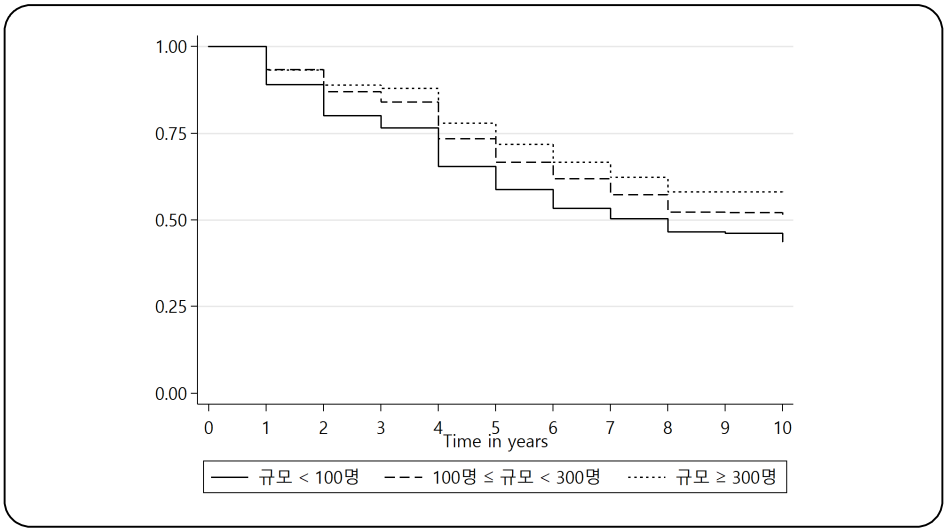
<Figure 3-3> Export survival function estimation result for food companies



Source: Author generated.

On the other hand, general manufacturing companies (Excl. food) in the over 300 scale show a rate of sustainability that is high in almost every section while the companies with 100~300 employees have the second highest rate of sustainability.

<Figure 3-4> Export survival function estimation result for manufacturers (Excl. food)



Source: Author generated.

In order to estimate the effects of corporate characteristics on export sustainability, the Cox proportional hazards model, which is a semi-parametric technique, was used (Cox 1972). The hazard function of the Cox model is shown in (10).

$$h(t|\boldsymbol{x}) = h_0(t)\exp(\beta_1 x_1 + \cdots + \beta_k x_k) \tag{10}$$

The $h_0(t)$ here is the baseline hazard function, while the $x_1,\cdots,x_k$ means the explanatory variables, and $\beta_1,\cdots,\beta_k$ means the estimated coefficients of the relevant variables.[14]

In the Cox model, it is assumed that a constant rate of risk exists regardless of time. When examining the proportional hazard assumption, we discovered no proof of violations.

[14] The $h_0(t)$ is not directly estimated in the Cox model but, it can be drawn from the cumulative risk function and baseline survival function. More detailed explanations on the Cox model can be found in the study of Cleves, Gould, and Marchenko(2016).

In our analysis we found that the number of years for being in business and the share in the same industry within the region for food companies decreased the risk probability of leaving the export market. In other words, it is inferred that companies with a long history have accumulated the management knowhow vital to lowering the risk of stopping exports, whereas companies with a large share in the same industry within the region received positive effects on continuing export due to the externalities such as the export infra in the region.

It was found that as the number of years for being in business, the number of employees, level of productivity, the share in the same industry outside the region, and the share in the same industry within the region for general manufacturers increases, the probability of stopping exports decreased. It was also found that increases in scale, productivity, share of the same industry outside the region all had positive effects on lowering the probability of stopping exports for manufacturing companies compared to food companies.[15]

<Table 3-6> Export stop hazard ratio for food companies and general manufacturers

	export stop hazard ratio	
	Food	Manufacturing
ln(# of years for biz)	0.71[b] (0.10)	0.82[a] (0.04)
ln(# of employees)	1.13 (0.15)	0.77[a] (0.03)
ln(total factor productivity)	1.09 (0.24)	0.92[b] (0.04)
Same industry outside the region portion	0.84 (0.76)	0.37[a] (0.09)
Different industry within the region portion	1.81 (1.70)	0.99 (0.23)
Same industry within the region portion	0.27[b] (0.14)	0.18[a] (0.03)
Observed value	756	18,444
Number of companies	168	3723
Verifying proportional hazard assumption	p = 0.17	p = 0.37

Note: The clustered robust standard errors are presented in the parenthesis. Each A and b implies the significance level of 1% and 5% respectively.

Source: Author generated.

15 The estimated result with the labor productivity instead of the total factor productivity (TFP) was not much from the original result.

2.3. Export sustainability analysis for agri-food firms

Even though export sustainability was previously examined by the survey of business activities, the export sustainability analysis for corporate items and corporate-country units has limitations since there is no information about export items and countries. In order to analyze the corporate items and corporate-country units, trade statistics including corporate information are required but this is not allowed by the Statistics Act. Therefore, the aT's export support program's performance data, which includes the required information, was used even if it does have a limitation due to selection bias for samples.[16]

2.3.1. Analysis methods and materials

In this section we analyze the export sustainability of agri-food firms by utilizing the aT's export support performance data (performance data for logistics support) for 2005~2017. The sustainability of an export routes (L) unit is analyzed by establishing combination (N, M) of export items and export market of company.

The number of companies, which received logistics cost support at least once for the period used in the analysis was 762, whereas 55 companies

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16 In this data, the export volume and export value by country and item (actual items based on AG codes) for agri-food companies are listed so that the period of a company's export of a certain item to individual overseas market can be examined. Of course, a company that exported without receiving any support may exist. However, there is no reason not to receive the export logistics support, which does not require any additional costs, if a company pursues cost reduction (or profit maximization) and satisfies the relevant requirements, since the standards for support items and subjects(companies) are not really particular. Looking at the public announcement (aT 2018) on the support plan for agri-food export logistics cost (central government) in 2018, there is no qualification specified for the qualification except the fact that the processed items may not be qualified depending on their portion of domestic materials used.

received the support for the entire 13 straight years. In addition, the export items and export markets, which received support during the period, were 114 and 113 respectively. Therefore, the export performance of maximum 114 (item N)×113 (market M) annually by company is possible. However, the export markets, to which a company exported the most annually, was 34 during the period of the analysis, and the number of export items, which a company exported the most variety of items, while the number of overall samples for all companies during the period of analysis was 22,639.

The share of the constantly maintained export routes and the continuing period of the export routes during the analysis period can be identified by using The Kaplan and Meier (1958)'s survival analysis. The survival probability ($\hat{S}_{lt}$), in which the import route l is maintained at a specific time t, can be defined as the formula in figure 11.

$$\hat{S}_{lt} = \prod_{s|t_s \le t} \left(\frac{x_{ls} - y_{ls}}{x_{ls}} \right) \tag{11}$$

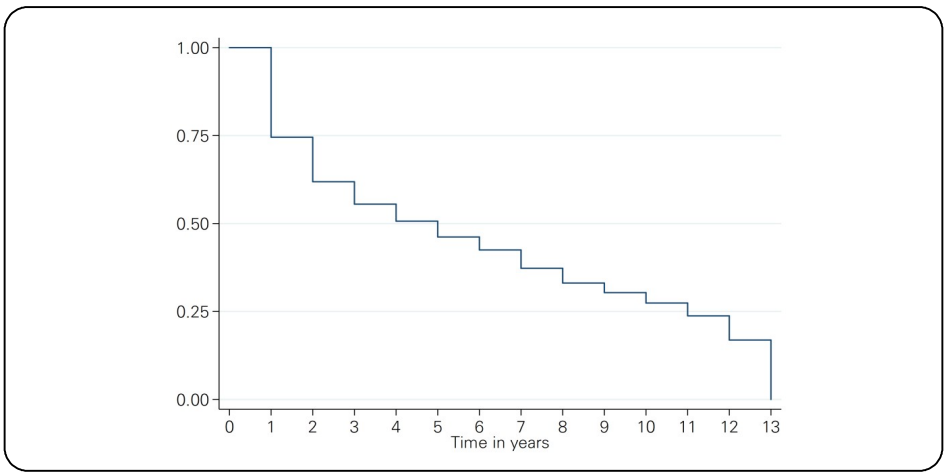
x_{ls} represents the number of export routes that is maintained until $t_s - 1$ whereas y_{ls} implies the number of export routes that have stopped at t_s. The survival probability function ($\hat{S}$) can be estimated by the non-parametric maximum likelihood estimation.

2.3.2. Result of analysis

<Figure 3-5> shows the results of the survival function estimation for the entire agri-food export routes for the analysis period. After export routes were created, it was found that the probability of exports being continued for the following year is 75%, 50% for continuing over 4 years (+3rd year), and 24% for over 11 years (+10th year). In other words, 25% of the new agri-food export routes in Korea had sustaining period of less than a year, and 50% will end at or before the 5th year. This is similar to the results of the Peterson et al.(2017) study which analyzed the fresh vegetable and fruit imports in the USA for 1996~2008, and showed a sustaining rate of 64% for +1st year, 45% for +3rd year, and 28% for +10th year. Nevertheless, the short-term sustaining rate of South Korea's agri-food export is higher

than that of the USA's fresh vegetable and fruit imports whereas the long-term sustaining rate is lower. Though there is a difference in the analyzed subject between the former that used the trade corporate-country unit and the latter that is based on the trade country-country unit, it was found that South Korea's agri-food exports do have a lower rate of survival than the other countries fresh fruits exports to the US when examining the criteria for sustainability over the first 5 years.

<Figure 3-5> Estimation result of export survival function for agri-food firms (2005~2017)



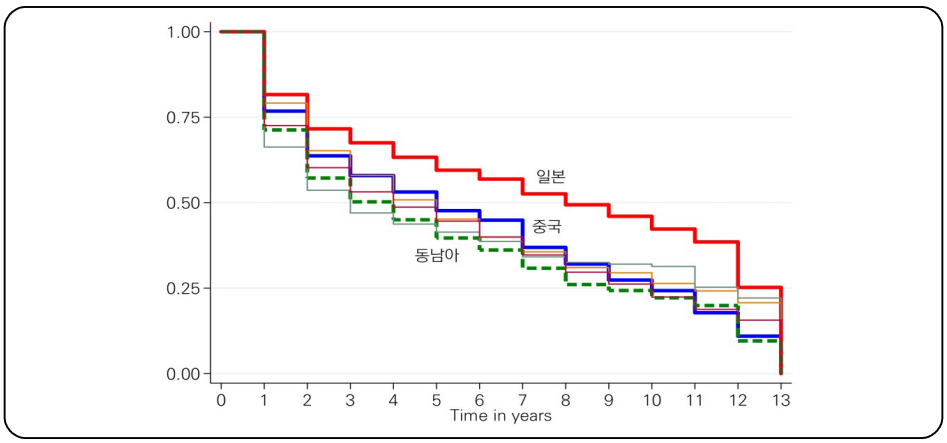
Note: The survival function was analyzed using 762 companies and the entire export routes (export market, export items) of 22,639 for the period of the analysis.
Source: Author generated.

On the other hand, the rates of agri-food export sustainability drawn from the foregoing study are higher than the results, which are the sustaining rate of 54% for +1st year, 33% for +3rd year, and 16% for +10th year, from the study by Sang-sik Jang (2015), which analyzed all new agri-food exporters from 2003~2014 in Korea. This likely related to the fact that agri-food exporters have higher initial fixed costs compared to general manufacturing exporters for entering new export markets. When exporting agri-food, there are more non-tariff actions from import countries such as quarantine, customs clearance, and hygiene criteria as compared to industrial products. Additionally, the supply chain (agri-food has longer distribution channels

compared to industrial products), which is required in order to maintain the freshness from the domestic market to the overseas markets, can function as an additional trade barrier. Therefore, agri-food exporters would have higher sunk cost that they would have to relinquish when giving up established export routes. They also have a tendency to avoid the re-entering costs (re-entering to the existing export market) needed to restore lost export routes.

<Figure 3-6> shows the result of examining the export sustainability rate of agri-food firms by classifying the export markets by region. We analyzed the export areas and categorized them in to the following: ① China, ② Japan, ③ SE. Asia, ④ the USA, ⑤ EU, and ⑥ others. We found that the Japan market has the highest export sustainability whereas the S.E. Asia market has the lowest export sustainability for Korean agri-food firms. This is because Japan is the largest export market for Korea's agri-foods and the market that Korean agri-food firms have the most experience working with. This is also a reflection of the shared business culture and trusting relationship. On the other side of the spectrum is the S.E. Asia markets, As inferred by Hanryu, these export routes are created and stopped more frequently since the history of development is relatively short for S.E. Asia markets. The S.E. Asia markets also have a more heterogeneous food culture.

<Figure 3-6> Estimation result of export survival function for agri-food firms by region(2005~2017)

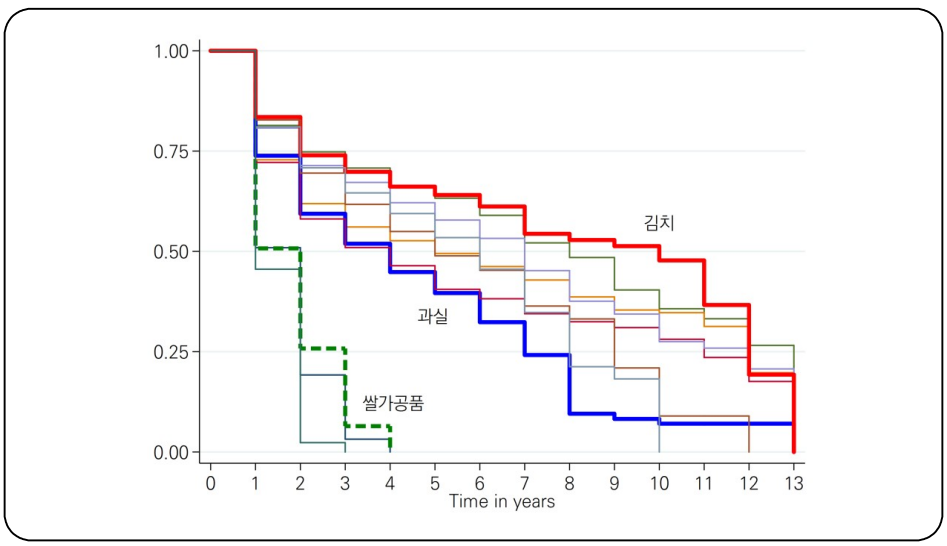


Note: The survival function was analyzed using the 762 companies and the entire export routes (export market, export items) of 22,639 for the period of the analysis.

Source: Author generated.

Next, the export sustainability rate was estimated by classifying the export items into 11 categories. The categories are as follows: ① grains, ② processed rice, ③ tea, ④ ginseng, ⑤ fruits, ⑥ vegetables, ⑦ flowers, ⑧ Kimchi, ⑨ livestock products, ⑩ traditional liquor, and finally ⑪ other processed products. As a result of our analysis, Kimchi had the highest export sustainability. Fruits showed a relatively low export sustainability since they are exported in a fresh state and are sensitive to the effects of domestic supply and demand, and fluctuation in their prices <Figure 3-7>. It was found that grains, processed rice, and other processed products have the lowest sustainability with not greater than 3~4 years of continuing export.[17]

<Figure 3-7> Estimation result of export survival function for agri-food firms by item group(2005~2017)



Note: The survival function was analyzed using the 762 companies and the entire export routes (export market, export items) of 22,639 for the period of the analysis.
Source: Author generated.

[17] Rice and rice processed products have a relatively short history of being exported, and they can be supported with export logistics costs only if the products' raw materials have more than 50% of domestic rice. Large company's products such as 'Haetban' were excluded from the subject of support.

The export performances were then compared by dividing the export routes into 3 types: creation, continuing, and extinction. As suggested in <Table 3-7>, the extinct export routes right after creation accounts for a 25.5% share, but the proportion of their export performance is just 5.2%. The share for the export routes continuing for over 2 years but extinct in the current year is 20%, and the proportion of their export performance is 14.6%. On the other hand, the export performance portion of the 'continuously surviving' export routes, which account for 54.5% of the entire export routes, reaches 80.3%. This implies that the companies continuously maintaining their export routes are the ones leading the stable growth of agri-food export.

<Table 3-7> Comparison of export routes distribution and export performance by type for the period for the analysis

Item	Type 1 (extinct after creation)	Type 2 (continuing)	Type 3 (Stopped)
number of export routes	5,765	12,347	4,527
export routes portion	25.5%	54.5%	20.0%
Total export value(KRW mil.)	3,640	56,600	10,300
Share of export value	5.2%	80.3%	14.6%

Note: Type 1 means export routes for extinct right after the creation (export routes created in each year but extinct in the following year), Type 2 implies the export routes continuously maintained in before/after the relevant year (including the export routes maintained in the following year after crated in the relevant year), and Type 3 means the export routes extinct in the relevant year.

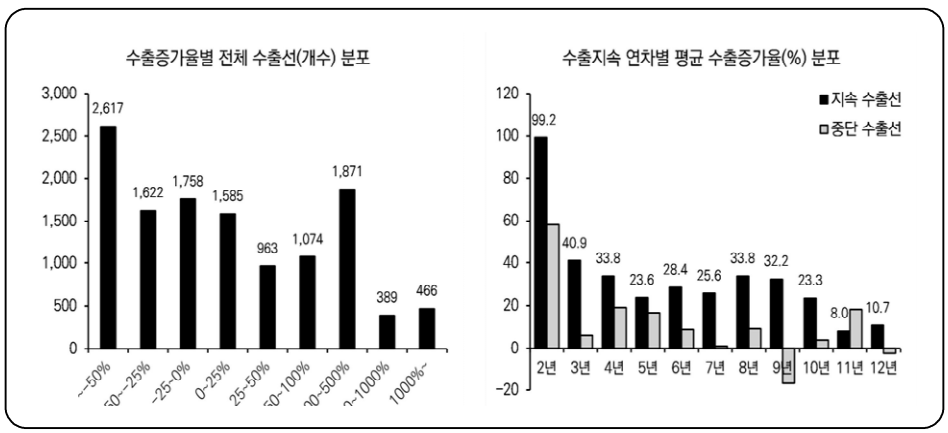
Source: Author generated.

The left-hand side graph of the below picture <Figure 3-8> shows 12,345 export routes with over 2 years of business and their export growth rate by section on the basis of YoY displaying their individual frequency. The right-hand side graph with continuing export routes and stopped export routes presents the average export growth rate for the relevant export routes in the order of continuing year. Examining the left side graph, it was found that the export routes with over 50% decrease in export value compared to the previous year account for the biggest share, approximately 21.2%. However, the export routes with 100~500% increase in export value as

compared to the last year account for 15.2%, whereas the export routes with over 500% increase in export value account for 6.9%.

As visualized in the right side graph, the export value increased almost 2 times in the following year after the start of exporting for the continuing export routes. This may be because the first year of export is done in a small scale in most cases. However, it was found that the export growth rate gradually decreases as the number of years of export increases. The export growth rate of companies continuing up to the 10th year is over 20% implying that they make a bigger contribution to the increase in exports than companies that stopped exports in the current year.

<Figure 3-8> Export routes by export growth rate and average export growth rate distribution by the order of continuing year



Source: Author generated.

2.4. Determinants for sustainability of agri-food exports

2.4.1. Analysis methods and basic statistics

The discrete-time duration model proposed by Hess and Persson (2011) is used as an empirical model to identify the determinants for whether to

continue trade.[18] The hazard rate of a particular trade relationship (the export routes of individual company in this study) l, which survives until the k^{th} period and becomes extinct, is defined as h_{lk}. This rate can be shown as the conditional random variables in the formula (12) since it is assumed that the trade relations continue until the k^{th} period and are affected by the specific factors.

$$h_{lk} = P(T_l < t_{k+1} \mid T_l > t_k, X_{lk}) = F(X_{lk}\beta + \gamma_k) \tag{12}$$

T_l herein acts as a successive random variable and has non-negative value to estimate the sustainability of trade relations (export routes) l. X_{lk} is a vector for explanatory variables affecting whether to continue exports, and β is an estimated coefficient vector for them, and γ_k is a function to set up to control probability of extinction as per the length of continuing duration. Lastly, the function F is a properly assumed distribution function making a random variable to have a value between 0 and 1 ($0 \leq h_{lk} \leq 1$).

For the purpose of empirical analysis, if defining it with binomial variables for example, y_{lk} will be 1 if the export routes l is ended in k^{th} period and be 0 value if it is continued. The log-likelihood function for the discrete-time duration model can be defined as the following formula (13).

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18 The discrete-time duration model has several merits compared to the Cox proportional hazard model. Firstly, when estimating the survival data with events (ties) occurred under the same survival time, the discrete-time duration model is relatively free from this bias compared to the Cox proportional hazard model. In addition, it can control the unobserved heterogeneity of the observed values more easily, while it can use conventional regression methods such as logit or Provit since it does not assume the proportional hazard (Hess and Persson 2011: 14). Lastly, the discrete-time duration model is more useful for analysis of large number of observed values (Peterson et al. 2017: 27). The export route data of this paragraph has more ties and number of observed values than the data used on the analysis in the 2.2 paragraph so the discrete-time duration model is used for the analysis.

$$\ln L = \sum_{l=1}^{n} \sum_{k=1}^{t_k} (y_{lk} \ln(h_{lk}) + (1 - y_{lk}) \ln(1 - h_{lk})), \quad t = 2005 \cdots 2017 \tag{13}$$

The number of entire export routes n is 22,639. Each export route can have consistent parameter estimates of regression coefficient only if they are independent from each other regardless of whether they the same company, market, or item. Lastly, the above function F can utilize Probit, logit, complementary log-log[19] estimate, etc. models if it complies with each normal distribution, logistics distribution, and extreme-value minimum distribution.

In this study, the binomial logistic regression model of the discrete hazard function regarding the stop of agri-food export routes is defined as the following formula (14).

$$\begin{aligned} y_{fcpt} = {} & \alpha_0 + \sum_{i=1}^{5} \beta_i seq_{fcpt} \times sp^i_{fcpt} + \beta_6 cencor_{fcp} + \beta_7 process_p \\ & + \beta_8 \ln(gdp_{ct}) + \beta_9 \Delta ex_{ct} + \beta_{10} np_{ft} + \beta_{11} nc_{ft} + \beta_{12} mp_{fpt} + \beta_{13} mc_{fct} \\ & + \beta_{14} nkf_{fcpt} + \beta_{15} rprice_{fcpt} + \beta_{16} shsub_{fcpt} + \beta_{17} \ln(fexv_{fcp}) \\ & + \lambda^{cg}_c + \lambda^{in}_p + \varepsilon_{fcpt} \end{aligned} \tag{14}$$

The dependent variable y_{fcpt} would have the value 1 if the export route $l = (f, c, p)$ ends in t year, and the value of 0 if it were continued. In accordance with precedent studies, independent variables such as export continuing period, income level of the export market, FX rate, product diversification and market diversification by exporters, and export scale of during the 1st year are all considered. We also added new explanatory variables such as relative export price and number of export competitors in the same export route, and share of logistics cost support on turnover (export support ratio). The variables and basic statistics used in the analysis are presented in the <Table 3-8>, and it also includes dummy variables by region (λ^{cg}_c) and dummy variables by export product item (λ^{in}_p).

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[19] F converts a real number into a value between 0 and 1 in the form of $1 - e^{(-e^x)}$ as similar as logit.

<Table 3-8> Variable and basic statistics used in the determinants analysis for export routes sustainability

Variables	Details	Average	Standard deviation
y_{fcvt}	dependent variables(relevant export route would be 1 when being stopped in t period, and otherwise 0)	0.453	0.003
sp^{i}_{fcvt}	The relevant export route would be 1 when it is included in the i^{th} continuing period (spell i), and otherwise 0. sp1 86.3%, sp2 11.8%, sp3 1.7%		
seq_{fcvt}	The number of years in which the relevant export route is constantly continued until the t period.	2.622	0.015
$censor_{fcv}$	It would be 1 when the relevant export route is cut from the left (2005), otherwise 0	0.050	0.001
$process_{p}$	If the relevant export product is processed food, it would be 1, and 0 for fresh produce	0.167	0.002
$\ln(gdp_{ct})$	log(GDP per capita for relevant import country), in US $	9.943	0.007
Δex_{ct}	FX rate of change in YoY for the relevant import country (%), in KRW(thousand)	0.632	0.727
np_{ft}	The entire number of export items(export items diversification index) for the relevant company	8.670	0.071
cp_{ft}	The entire number of export market (export market diversification index) penetrated by the relevant company	8.587	0.043
mp_{fvt}	If the item is the main item for the company, it would be 1, otherwise 0 (in share of export item)	0.463	0.003
mc_{fct}	If the market is the main export market for the company, it would be 1, otherwise 0 (in share of export market)	0.320	0.003
nkf_{fcvt}	The number of South Korea's exporters exist in the relevant export route (including oneself)	7.160	0.060
$rprice_{fcvt}$	The relative export price ratio for the relevant export route (%) - Unit cost for relevant exporter/ average unit cost for export of entire South Korea companies(including oneself)	1.985	0.081
$shsub_{fcvt}$	export support ratio(%) for the relevant export route, the share of logistics cost support amount on the export value	6.819	0.049
$\ln(fexv_{fcv})$	log((at continuously maintained spell) the 1^{st} year's export value(KRW) for the relevant export route)	16.915	0.015

Source: Author generated.

Considering the fact that the logit estimator is not linear to variables, and the time series is a relatively short panel of data (8,683 units of export route, 13 units of year), the random effect model was chosen instead of the fixed effect model, where it is difficult to secure consistent estimators.[20] Therefore ε_{fcvt} includes the particular effects of an individual export route,

which cannot be observed as the error term, where it is assumed that these particular effects of an individual export route do not have relations with others independent variables.[21] For the above estimation model, the representative particular effects of export routes include the non-tariff barriers such as customs clearance processes being differentially applied by item and import country, animal and plant quarantines, food hygiene examinations, as well as the import tariff.

2.4.2. Analysis results

<Table 3-9> and <Table 3-10> are the binomial logistic regression model estimation results of the discrete hazard function using the 2005~2017 agri-food export routes panel data. The results of analysis on overall samples and the results of analysis for export markets by region are included in the <Table 3-9>, while the results of analysis for export item group is presented in <Table 3-10>.[22] The odds ratio is used for interpreting the results.

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[20] It is a well-known 'Incidental parameter problem' (Lancaster 2000). Nevertheless, a panel analysis has merit by increasing the efficiency of estimators since it reduces bias of estimator, which may occur in a cross-section analysis. It also decreases the multi-collinearity issue when conducting a time series analysis. Additionally, it identifies the changes of variables over time, as well as changes by the difference of cross-section subjects.

[21] The random effect model may have occurrences of bias due to the correlation between observable independent variables and non-observable variables since it considers the effect of an individual export route as a part of error term. In this case, the 'particular effects of unobserved export routes' from the variance of error term can explain that the share (ρ) is 0 verifying the null hypothesis by the random effect model. If this null hypothesis cannot be rejected, it is perceived as reasonable to apply the random effect model. All the estimate results hereinafter could not reject the relevant null hypothesis.

[22] Meanwhile, it cannot be interpreted as average marginal effects of a general regression model since the explanatory variable estimation ($\hat{\beta}_i$) of the logit model is $\partial \log(p/(1-p))/\partial x_i$. Thus the odds ratio $\exp(\hat{\beta}_i)$ is also presented for the bias of interpretation of estimated results in <Table 3-9> and <Table 3-10>.

The odds ratio shows the probability of export routes ceasing or continuing when 1 unit of an explanatory variable changes. Therefore, changes in 1 unit of an explanatory variable increases the probability of export routes continuing if the odds ratio is statistically significant and yet less than 1 (estimated coefficient has negative value).

In order to examine the effects of an export route's continuation period on the probability of an export ceasing, the variable (seq_{it}) meaning the number of continuing years until the t period for the individual export route and the cross-term of the dummy variable (sp_{it}^{i}) meaning the ith period (ith spell) of the individual export route continuously maintained is added as the explanatory variable. $sp^{i}=1$ when $i \geq 2$ meaning that the relevant company was more than once eliminated from the same export route and then reentered during the period of the analysis.[23]

Examining the entire sample's estimation result, it was found that the three estimated coefficients of cross-terms ($seq_{it} \times sp_{it}^{i}$) had a significant positive value, and the coefficient values got bigger as i got bigger. This means that the probability of an export route ceasing is bigger than that of it continuing as the years of continuous export increase, Additionally, the probability of an export route ceasing gets higher when exiting and reentering for the 3rd time. To present this more accurately with the odds ratio, the probability of the export route to cease rather than continue increases by 15.1% as the years of continuous export increase by 1 year, and the probability is increased to 19.5% for the re-entering. These results are contrary to the results from most preceding studies. The major reason for this is that the prior studies have mainly analyzed trade sustainability between countries whereas this study analyzed the trade (export) sustainability be-

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[23] For instance, suppose that a company's export route had been continuously maintained from 2005 to 2008, and it ceased to exist from 2009 to 2011, then it re-maintained from 2012 to 2016. This export route has two constant export periods (spells) where the first period (1st spell) is 4 years, and the second period (2nd spell) is 5 years. In this case, the observed value of the 2007 export route seq is 3, and sp^{1} is 1, whereas the observed value of the 2016 export route seq is 5, and sp^{2} is 1. Also, u_{it} is 0 since 2007 is the year that the export is continued, but u_{it} is 1 since 2006 is the year that the export is stopped.

tween companies and countries so it became clear that particular export routes have been stopped more frequently. It is natural for the probability of an individual domestic company's Kimchi exports to Japan to cease, to be much larger than the probability of Korea's Kimchi exports to Japan to cease. In fact, the study of Peterson et al.(2017), in which the USA's import sustainability for fresh vegetables and fruits from various countries is analyzed, shows that the average period of continuous import routes is 6.8 years whereas that for export routes is 2.2 years in this study. In addition, the prior studies classify items with mainly HS 6 digits whereas this study classified actual items with more detailed criteria, thus making the average period of continuous export routes shorter. The result of this study implies that 'Korea's agri-food firms have a higher possibility of exports to cease as the export routes continue'. Therefore, more effective policies are necessary and vital for enhancing export sustainability of business units.

If a relevant export route already exists in 2005, the first year of the period for the study, the possibility of the actual period for export sustainability to be cut is fairly high. There were 1,130 such export routes in the study sample and these account for 5% of the entire sample, but the calculated possibility of an export route continuing was 40% higher than the possibility of it stopping in the case of the export route being cut in the left side. Also, it was found that the possibility of export routes to cease for processed food was 27% higher than for them to continue. As found in the prior studies, the probability of an export route continuing increased with the scale of the first year exports ($fexv_i$).

The GDP and FX rate of import countries were next considered as external variables affecting export sustainability. Our analysis showed that the possibility of an export route continuing increased with the size of the import country's GDP per capita, whereas the FX rate of an import country in KRW had no effect. [24]

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[24] Suppose that FX rate increases from KRW1,000=JPY100 to KRW1,000=JPY110 (reflect the changes in KRW-US$ rate), it was initially expected that the possibility of exports ceasing would be higher than that to continue in the Japan market, but the effects of FX rate change on the risk of exports ceasing was not significant (estimation sign is positive as expected).

<Table 3-9> Binomial logistic regression model estimation result of discrete hazard function for export stop (overall sample, and by export market area)

	Overall sample			China(cg=1)			Japan(cg=2)			SE.ASIA(cg=3)			the US(cg=4)			EU(cg=5)			Others(cg=6)		
Variable	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio
$seq \times sp1$	0.140[a]	0.018	1.151	0.112[a]	0.049	1.118	0.046	0.041	1.047	0.174[a]	0.043	1.190	0.212[a]	0.054	1.236	0.084	0.064	1.087	0.121[a]	0.034	1.128
$seq \times sp2$	0.178[a]	0.026	1.195	0.007	0.067	1.007	-0.092	0.085	0.912	0.243[a]	0.061	1.274	0.265[a]	0.070	1.303	0.150	0.099	1.162	0.168[a]	0.048	1.183
$seq \times sp3$	0.211[a]	0.065	1.235	-0.154	0.204	0.857	-0.418[c]	0.216	0.658	0.215	0.136	1.240	0.418[c]	0.221	1.519	0.383	0.396	1.467	0.244[b]	0.108	1.276
$seq \times sp4$	0.200	0.202	1.221	-0.790	0.703	0.454	-0.852	0.771	0.427	0.132	0.324	1.141	1.017	0.836	2.764	0.367	1.134	1.444	0.314	0.391	1.368
$seq \times sp5$	0.177	1.085	1.193																0.188	1.081	1.207
$censor_{fas}$	-0.506[a]	0.084	0.603	-0.561[b]	0.260	0.571	-1.714[a]	0.275	0.180	-1.268[a]	0.231	0.281	-0.923[a]	0.230	0.398	-1.250[a]	0.375	0.287	-0.164	0.159	0.849
$process_{a}$	-0.316[a]	0.112	0.729	-0.303	0.252	0.739	-0.810	0.788	0.445	-0.579[b]	0.260	0.560	-0.351	0.336	0.704	-0.005	0.547	0.995	-0.206	0.199	0.814
$\ln(gdp_{ct})$	-0.055[b]	0.026	0.946	-0.343[a]	0.085	0.710	-7.893[a]	2.595	0.000	-0.022	0.038	0.978	1.510[a]	0.355	4.528	-0.238	0.230	0.788	-0.182[a]	0.047	0.833
Δex_{at}	-0.0002	0.0002	1.000	-0.038[a]	0.003	0.963	0.005	0.004	1.005	0.0001	0.0001	1.000	0.051[a]	0.007	1.052	0.002	0.008	1.002	-0.007[b]	0.003	0.993
np_{ft}	0.006[a]	0.002	1.006	0.000	0.008	1.000	-0.001	0.012	0.999	0.036[a]	0.006	1.036	-0.007	0.006	0.993	0.021[b]	0.010	1.022	-0.008[c]	0.004	0.992
cp_{ft}	-0.039[a]	0.004	0.962	-0.052[a]	0.013	0.949	-0.030	0.020	0.970	-0.084[a]	0.010	0.920	-0.065[a]	0.012	0.937	-0.031[b]	0.014	0.969	-0.021[a]	0.007	0.979
mp_{fat}	-0.253[a]	0.049	0.776	-0.226	0.146	0.797	-0.502[a]	0.174	0.606	-0.117	0.100	0.890	-0.387[a]	0.145	0.679	-0.387[c]	0.199	0.679	-0.302[a]	0.087	0.739
mc_{fat}	0.011	0.052	1.011	-0.372[a]	0.135	0.689	-0.120	0.181	0.887	-0.042	0.128	0.959	-0.682[a]	0.132	0.505	-0.729[b]	0.337	0.482	0.411[a]	0.095	1.508
nkf_{fast}	-0.027[a]	0.003	0.973	-0.007	0.007	0.993	-0.197[a]	0.015	0.821	0.027	0.024	1.027	0.124[a]	0.019	1.132	-0.139	0.122	0.870	-0.010[b]	0.006	0.990
$rprice_{fast}$	0.005[a]	0.002	1.005	0.005	0.003	1.005	-0.005	0.016	0.995	0.024[a]	0.008	1.025	0.063[a]	0.020	1.065	0.003[c]	0.005	1.003	0.003	0.002	1.003
$shsub_{fast}$	0.010[a]	0.003	1.010	0.022[b]	0.010	1.022	0.074[a]	0.014	1.077	0.004	0.005	1.004	-0.019[c]	0.010	0.981	0.018	0.012	1.018	0.007	0.005	1.007
$\ln(fexv_{fas})$	-0.275[a]	0.013	0.760	-0.348[a]	0.037	0.706	-0.295[a]	0.041	0.745	-0.333[a]	0.029	0.717	-0.352[a]	0.041	0.703	-0.302[a]	0.054	0.739	-0.267[a]	0.023	0.766
Area dummy	O			X			X			X			X			X			X		
Item group dummy	O			O			O			O			O			O			O		
Observations (N)	22,541			3,107			3,275			5,093			2,670			1,457			6,939		
Export routes (L)	8,683			1,121			1,030			2,114			973			640			2,805		
LR	-14,324			-1,754			-1,770			-3,224			-1602			-875			-4,484		
ρ	0.291	0.019		0.277	0.052		0.459	0.056		0.291	0.041		0.218	0.056		0.305	0.072		0.264	0.035	

Note: Each a, b, and c implies the significance level of 1%, 5%, and 10% respectively.

Source: Author generated.

<Table 3-10> Binomial logistic regression model estimation result of discrete hazard function for export stop (by export item group)

	tea(in=3)			ginseng(in=4)			fruits(ind=5)			vegetables(id=6)			flowers(in=7)			Kimchi(in=8)			livestock products(in=9)			traditional liquor(in=10)		
Variable	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio	Estimate	Prediction error	Odd ratio
$seq \times sp1$	0.246[a]	0.060	1.279	0.089[a]	0.038	1.093	0.337[a]	0.058	1.400	0.094[a]	0.029	1.099	0.246[a]	0.074	1.279	0.183[b]	0.073	1.201	0.369[a]	0.129	1.446	0.448[a]	0.140	1.565
$seq \times sp2$	0.249[a]	0.089	1.283	0.107[a]	0.052	1.113	0.427[a]	0.075	1.532	0.193[a]	0.049	1.212	0.154	0.109	1.167	0.142	0.100	1.153	0.517[a]	0.179	1.677	0.450[a]	0.164	1.568
$seq \times sp3$	0.550	0.393	1.733	0.453[a]	0.150	1.572	0.878[a]	0.287	2.407	0.109	0.099	1.116	0.050	0.177	1.051	-0.148	0.287	0.862	2.192[c]	1.300	8.949	1.056	0.716	2.875
$seq \times sp4$	-0.041	1.180	0.960	0.136	0.253	1.146				0.271	0.440	1.311				0.282	0.811	1.326						
$seq \times sp5$				0.131	1.084	1.140																		
$censor_{fas}$	-0.434	0.327	0.648	-0.739[a]	0.215	0.478	-0.898[a]	0.187	0.408	-0.242[c]	0.143	0.785	-0.633[c]	0.352	0.531	1.177[a]	0.384	3.246	-1.527[b]	0.707	0.217			
$process_{fa}$				-0.439[a]	0.180	0.645													-0.994[a]	0.361	0.370			
$\ln(adp_{ct})$	0.035	0.111	1.035	-0.020	0.066	0.980	-0.086	0.057	0.918	-0.087[b]	0.044	0.916	-0.423[b]	0.209	0.655	-0.179	0.133	0.836	-0.116	0.164	0.890	-0.348[b]	0.165	0.706
Δex_{ct}	-0.014[a]	0.005	0.987	-0.012[a]	0.004	0.988	0.0001	0.0003	1.000	-0.015[a]	0.002	0.985	0.006	0.007	1.006	-0.008	0.006	0.992	-0.002	0.006	0.998	-0.014[c]	0.008	0.986
np_{fc}	0.040[c]	0.023	1.041	0.078[a]	0.017	1.081	0.015[b]	0.006	1.015	-0.007[c]	0.004	0.993	0.001	0.019	1.001	0.002	0.015	1.002	0.079[a]	0.028	1.082	0.346[b]	0.155	1.413
cp_{fc}	-0.050[a]	0.018	0.951	-0.111[a]	0.013	0.895	-0.077[a]	0.014	0.926	-0.021[a]	0.006	0.979	0.064	0.039	1.066	0.001	0.015	1.001	-0.153[a]	0.053	0.858	-0.131[a]	0.030	0.878
mp_{fct}	-1.181[a]	0.301	0.307	-0.197[c]	0.116	0.821	-0.218[b]	0.103	0.804	-0.170[b]	0.083	0.844	0.188	0.267	1.207	-0.717[b]	0.307	0.488	-1.215[a]	0.371	0.297	0.572	0.813	1.772
mc_{fct}	-0.001	0.239	0.999	-0.284[c]	0.146	0.753	-0.034	0.119	0.967	0.087	0.082	1.091	-0.037	0.308	0.964	0.128	0.313	1.137	-0.364	0.275	0.695	0.259	0.521	1.296
nkf_{fact}	-0.056[a]	0.013	0.946	-0.031[a]	0.010	0.969	0.007	0.008	1.007	-0.015[a]	0.005	0.985	-0.095[a]	0.016	0.910	-0.044[a]	0.016	0.957	-0.089[a]	0.020	0.914	-0.102[a]	0.031	0.903
$rprice_{fact}$	-0.202	0.315	0.817	0.062[a]	0.022	1.064	0.151[b]	0.075	1.163	0.003[c]	0.002	1.003	0.048	0.034	1.049	0.944[c]	0.555	2.571	-0.530[a]	0.158	0.588	0.838[a]	0.303	2.311
$shsub_{fact}$	-0.024	0.018	0.977	0.0004	0.007	1.000	0.036[a]	0.008	1.037	0.006	0.005	1.006	0.036b	0.018	1.037	0.027	0.032	1.027	-0.033[b]	0.032	0.968	0.054[b]	0.025	1.055
$\ln(fexu_{fct})$	-0.435[a]	0.068	0.647	-0.373[a]	0.040	0.689	-0.354[a]	0.036	0.702	-0.252[a]	0.019	0.777	-0.429[a]	0.071	0.651	-0.325[a]	0.069	0.723	-0.448[a]	0.098	0.639	-0.424[a]	0.125	0.655
Area dummy	O			O			O			O			O			O			O			O		
Item group dummy	X			X			X			X			X			X			X			X		
Observations (N)	1,917			3,081			4,626			8,397			1,220			1,260			869			589		
Export routes (L)	562			1,057			1,919			3,494			394			379			302			188		
LR	-1093			-1,867			-2,969			-5,410			-713			-752			-509			-338		
ρ	0.435	0.071		0.296	0.045		0.334	0.048		0.264	0.031		0.446	0.080		0.348	0.090		0.362	0.123		0.328	0.132	

Note 1) The grains(in=1), processed rice(in=2), and other processed goods(in=11), which did not have enough observed values of export routes, are excluded in the analysis.

2) Each a, b, and c implies the significance level of 1%, 5%, and 10% respectively.

Source: Author generated.

The following notable results regarding the diversification of items and market diversification were drawn during our study. The probability of a company's export to cease versus continue, increased by 0.6% as the entire number of export items for representing the diversification of items increased by one. On the other hand, the probability of a company's export route to continue versus ceasing, increased by 3.8% as the entire number of export markets that the companies penetrated representing the diversification of markets increased by one. In addition, it was found that the odds ratio of dummy variables implying whether the item is the main item for the company or not was 0.776, but the variables for identifying whether the market was the main market or not was not statistically significant.

These results imply that market diversification has positive effects on export sustainability and that the diversification of items has negative effects on the export sustainability. Our results also suggest that export routes for the main items have a higher possibility of continuing, but export routes for the non-main items in the main market have a lower possibility of continuing.

Meanwhile, the number of South Korean exporters present in the relevant export routes was included as the explanatory variable affecting export sustainability to verify the theory that the probability of an export rout ceasing increases as competition among domestic companies intensifies in the same export routes. However, the result was the opposite. It was found that if one more domestic exporter exists in the same export route, the probability of export sustainability (vs that of stop) increases by 2.7%. This implies that direct effects are much bigger that the effects of competition among domestic companies. This result also suggests that increasing the number of domestic exporters in an individual export route has multiple positive effects. Such as increasing product awareness in the market, improving export performance by transferring or learning export know-how or marketing strategy among domestic companies, and creating strategic collaboration such as sharing of logistics system, using joint brands, and joint marketing strategies (local advertisement, sales events, etc.) that would have cumulative positive effects.

An export price was calculated by dividing the unit cost for export of the relevant export route by the average unit cost for export of all Korean com-

panies (including oneself) in the relevant export route. This value represents an index for price competitiveness for exporters and is included in the explanatory variable. Our analysis found that the odds ratio for an export route to cease increased as the export price of a company exceeded the average export price for all companies.

Lastly, it was found that the odds ratio for an export route to cease increased by 1% as the share of the logistics cost support on the export value, that is the export support rate of each export route, increased by 1%. This implies that the logistics cost support may be helpful for export expansion in the short term, but it may be offset by the company's efforts such as voluntary local market surveys, post management, quality improvement, or cost reduction.

The second row of <Table 3-9> shows that the export market is divided into 6 areas that isolate the export routes. The results are presented by estimating with the same method (dummy by region not included). Overall, the result for the entire sample was generally similar but some explanatory variables showed the opposite sign in the estimation result by region. For example, the probability of an export to be stopped is higher than that to be stopped as CNY on KRW rate increases in the China market. It is possible to infer that the export sustainability for Korea's agri-food can be further enhanced if: one secures quality competitiveness in the China market, China's rapid economic growth increases the demand for South Korea agri-food, there is in an increase of high income consumers, or proliferation of Hanryu offsets the effects of higher price caused by increased FX rate. On the other hand, we found that the probability of an export to cease was higher as the GDP per capita increased in the US market. This implies that South Korea's agri-food was not perceived as a high value-added import product until now in the US market. In addition, the probability of an export to cease was higher as the number of exporters increased in the same export route, whereas the high export support rate had positive effects on export sustainability. These results imply that the probability of an export to cease increases as the number of competitors increases, since the US market is the market where the most domestic agri-food firms have entered, but export sustainability can be improved by cost reduction through export support in these market environments.

<Table 3-10> shows the result of estimates (dummy by item not included) of the same binomial logit model after classifying items into 8 groups. For the rate of change in FX rate the significant estimates with the opposite sign (-) from the entre sample were measured in tea, ginseng, vegetables, and livestock products. However, the confidence-interval of 95% for all odds ratios contains 1, so the relevant effects seem to be minimal. Also, it was found that item diversification does have positive effects on export sustainability for vegetables, which was different from the case with the entire sample. Lastly, for livestock products the probability of an export continuing was higher than the probability of it ceasing as the relative export price increased. It can therefore be inferred that livestock products with quality competitiveness rather than the price competitiveness may have higher export sustainability.

3. Major Characteristics and Implications

The results of analyzing the determinants can be summarized as follows. Based on the analysis by industry, the decision to export and productivity in the previous year have positive (+) effects on export decision making in the current year for both food and general manufacturers. Therefore, the trade theory considering heterogeneous companies in both food and general manufacturers, in other words, the self-selection theory, that the decision to export for a company is determined by the fixed cost and productivity, is verified.

The number of years of being in business, one of the representative corporate characteristics, has positive (+) effects on export decision-making, concurring with previous empirical analysis results. It was found that the number of employees for food companies does not have significant effects on export decision-making. However, the possibility to make a decision to export increases as the manufacturers' scale becomes bigger.

The effects of externality vary depending on the industry but it did not have an effect on export decision making for agri-food firms. On the other

hand, it was found that a different industry within the region and the same industry outside the region do have effects and increase the possibility for export of general manufacturers. However, the direct effects of externality such as logistics, infra, and export knowhow have bigger effects than the competition effect for manufacturing (other than F&B manufacturing), leading to positive effects on decisions to export.

As a result of additionally verifying the learning by exporting theory, we found no evidence that entering the export market itself had effects on the increase of productivity. This implies that improving the productivity of company as a whole to increase the chance of entry to the export market, but increasing the entry to export does not improve the productivity of the industry as a whole. Therefore, it is desirable to establish policies to focus more on increasing exports by improvements in productivity for expanding the entry of agri-food firms to the export market.

As a result of analyzing export sustainability by industry, the number of years for being in business, number of employees, and having similar industry within the region are factors that affect the export sustainability for food companies. However, unlike with general manufacturing, productivity did not have significant effects on export sustainability for agri-food companies. Nevertheless, it was found that the effects of externality (share of exporters in the same industry within the region), which was not significant for export decision making, did have impact on export sustainability. These results appear to reflect the characteristics of the agri-food industry, which can be classified by item to have a favorable position over manufacturing. In other words, the synergy effect among the exporters in the major production sites for exporting particular agricultural products appears to be helpful for continuation of export. Therefore, policies supporting major production sites for the major export items would increase the chances to continue export for companies in the region, thus playing a positive role in the stable growth of agri-food exports.

As a result of analyzing the export sustainability for agri-food firms by item and export destination, it was found that 25% of Korea's new agri-food export routes for the period of continuation is less than a year, and 50% have stopped within the 5^{th} year. The share of export performance for continuing export routes (54.5% of export routes) is 80.3%, so it can be in-

ferred that the companies with continuing export routes lead agri-food exports. Dissecting the export markets into 6 regions (China, Japan, S.E. Asia, the USA, EU, and others), revealed that the Japan market has the highest export sustainability while the S.E. Asia market's export sustainability is the lowest. We also observed that Kimchi's export sustainability was the highest among the 11 item categories analyzed, while the years of continuing export for fruits, grains, processed rice, and other processed products were relatively shorter.

Next the factors having effects over the sustainability of export routes were analyzed. As a result, it was found that the probability of an export to cease increased as the years of continuous export increased. It was also found that diversifying items would increase the probability of export routes to cease, whereas diversifying export markets would increase the probability of export routes to continue. This result suggests that the existence of similar export routes is working as a direct effect to increase the possibility of export sustainability. However, the probability of export routes to cease increased as the relative export price increases and export support rate was higher. Additionally, the probability of export routes to be continued increased with the GDP of import country.

Our analysis by region revealed that the possibility of export sustainability increased as the FX rate (CNY on KRW) increased in China. Also, the existence of the same export routes in the USA increased the probability of export to cease, whereas the possibility of export sustainability increased as the export support rate increased. In our analysis by item, it was found that item diversification for vegetables had positive effects on export sustainability, while the possibility of export sustainability increased as the relative export price for livestock products increased.

The agri-food firms with continuous exports had a higher share of the entire agri-food export market, implying that export sustainability plays an important role in not only stable growth but also expansion of exports. It was also found that market diversification has positive effects on the probability of export routes to continue, but item diversification increased the probability of export routes ceasing. Therefore, a strategy that pursues market diversification while focusing on the main export items of individual companies is still valid for export sustainability and the stable export growth.

Nonetheless, preparing countermeasures is important for long-term export stability considering the external risks. Even though the concentration strategy on a particular item such as Kimchi can increase the sustainability of exports, it is still vulnerable to political changes in the counter country, such as changes in quarantine and food safety standards. In this case, expanding the export destination countries can disperse external risks. However, it will reach a point where further market expansion is difficult to accomplish. Therefore, in the long conducting diversification and development of competitive items should ease external impacts or risks even if a company suffers from the rise of costs in R&D investment in the short-term.

Chapter 4. STRATEGY AND PERFORMANCE OF AGRI-FOOD EXPORTERS

In this chapter we use surveys to analyze strategic factors affecting the determinants for export decision making and the export performance of companies. The subjects of our surveys include the producers' organizations, that produce and export fresh produce or simple processed agri-food, and the export-specialized companies that handle the export of items for the above entities. Producers' organizations are important subjects for the relevant government's agri-food export policies (NH, agricultural association corporations, agriculture corporations), The results of questionnaires on the scope of utilization and the level of satisfaction with the export support programs for agri-food firms were included in the surveys in order to analyze the actual status of using the programs by the agri-food firms and to function as baseline data for improving the programs.

We first analyze the characteristics and current status of the agri-food exporters based on the survey results as well as what constitute effective strategies based on export performance. We also include the conjoint analysis for "export support program's performance data" used in Chapter 3 matched with survey subject companies.

Next, the relationship between export performance and the export strategies by agri-food firms' type was analyzed. Finally, more effective export strategies can be revealed by complementing the results of this analysis with the case studies on companies by type.

1. Surveys on agri-food exporters

Surveys were conducted to identify the differentiated export strategies of various agri-food firm types. The surveyed agri-food firms were selected by considering the region, company scale, export items (fresh and processed), and so forth. The survey was preceded by a visit and interview of 500 companies arranged by a professional survey agency after finalizing the survey questionnaires through preliminary interviews.

The results of our survey analysis were used to identify the current status and type of agri-food firms' export, and for analyzing the factors affecting the export decision making and strategy of agri-food firms by comparing and analyzing the export strategies of the companies by type. In addition, the survey results on the scope of utilization and satisfaction of export support programs for agri-food firms by type were utilized as basic data necessary for improving the export support programs as well as for analyzing the actual status of export support programs for the companies by type.

The major contents of the surveys include the major characteristics of agri-food exporters, export performance (item, export market), the company's

<Table 4-1> Survey for agri-food firms' export strategy analysis

Subject	○ 500 agri-food exporters
Survey period	○ August ~ September 2018
Method	○ Visit subject companies and interview(survey specialized agency consigned)
Major contents	○ agri-food exporters characteristics and current status ·general current status of company, turnover and export value, major export items, major export market countries ·overseas penetration plan and difficulties, reasons for overseas market penetration, export manner, global competitiveness ·satisfaction level on export performance, domestic and overseas market growth ·current status of financial structure scale ○ export strategies of agri-food exporters and export support programs ·Detailed export strategy by strategy elements ·participated export support programs and efficacy/satisfaction level, importance, wanted export support programs

Source: Author generated.

current status, any difficulties encountered in overseas market penetration, the main export item's global competitiveness and export performance, and evaluation of satisfaction (refer to <Table 4-1>). In addition, the export strategy, efficacy of export support programs, and satisfaction level were examined for overseas market penetration and export increase for agri-food exporters.

Among the survey subject agri-food exporters, it was found that the companies exporting only fresh produce (hereinafter referred to as 'fresh agricultural products exporters') account for 25.8% (129) of the entirety., The companies exporting only processed agri-food (hereinafter referred to as 'processed agri-food exporters') account for 72.2% (361), and the companies exporting both fresh produce and processed agricultural products (hereinafter referred to as 'fresh and processed agri-food exporters') account for just 2.0% (10). It was found that these agri-food firms had an average of 8 years of export experience and this ranged from a minimum of 1 year to a maximum of 58 years.

The distribution fresh agricultural product exporters with 1~5 years, 6~10 years, and over 11 years of export experience was 33.9%, 25.8%, and 40.3% respectively, while that for processed agri-food exporters was 54.8%, 22.7%, and 22.4%, respectively and that for fresh and processed agri-food exporters was 40.0%, 13.3%, and 46.7% respectively. Among these exporters, it was found that the exporters operating an exclusive exports department accounted for 34.6% (173) of the entirety, whereas the exporters having a sales department conducting exports accounted for 42.0% (201) The exporters not operating any separate department for exports accounted for 25.2% (126).

<Table 4-2> shows the major characteristics of the survey subject agri-food exporters. It was found that when considering all agri-food export items, direct production items accounted for more than 2-times as much export volume as consigned production items. When considering the method of export, the share of direct export was over 4 times higher than that of consigned export. Looking into the production methods and manner of export, it was found that the production method of agri-food exporters exporting mainly fresh agricultural products had a similar portion of consigned production and direct production, whereas for the export method the share

of direct export was over 2 times higher than consigned export. In the case of the agri-food exporters exporting only processed food, direct production was approximately 4 times higher than consigned production, whereas direct export was about 6 times higher than consigned export. On the other hand, it was found that agri-food exporters handling both fresh produce and processed food had a high share of consigned production and direct export.

<Table 4-2> characteristics of agri-food exporters survey subject

unit: number of unit, %

Subject		Production method				Export method			
		Direct production	Consigned production	Direct and Consigned production	Total	direct export	consignment export	direct and consignment export	Total
Entirety		318 (63.6)	124 (24.8)	58 (11.6)	500 (100.0)	376 (75.2)	91 (18.2)	33 (6.6)	500 (100.0)
export items	fresh	57 (44.2)	61 (47.3)	11 (8.5)	129 (100.0)	87 (67.4)	41 (31.8)	1 (0.8)	129 (100.0)
	processed	259 (71.7)	59 (16.3)	43 (11.9)	361 (100.0)	282 (78.1)	47 (13.0)	32 (8.9)	361 (100.0)
	fresh and processed	2 (20.0)	4 (40.0)	4 (40.0)	10 (100.0)	7 (70.0)	3 (30.0)	0 (0.0)	10 (100.0)

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis.

Even though companies can be divided in various ways depending upon the objective of the study, in this study we divided the companies by applying the following 3 conditions: export items[25], production method, and corporate scale.

Processed food was divided by the production method (direct or consigned) for the export product of company, and the corporation type was

[25] The export items of the various companies are classified into 12 groups. However, the type of export items is simplified into fresh and processed considering the number of variables to be used in the analysis and the numbers of the sample by group.

divided by scale considering that the variance of corporate scale (# of employees) and distribution is huge for direct production. <Table 4-3> shows the type of company classified into 4 groups. First, the companies exporting only fresh produce are in Type A (hereinafter fresh agricultural products exporters). The other types are for processed food exporters, which were classified into B1, B2, and Type C. From the companies in Type B1 and B2 with direct production, the companies with a number of employees of below 10 fall under Type B1 (hereinafter referred to as small scale processed agri-food exporters), that of 11 or more employees is Type B2 (hereinafter referred to as Medium-size exporters for processed agri-food). Among the companies exporting mainly processed food, the companies have consigned production or export after purchasing the products fall under Type C (hereinafter referred to as Consigned production exporters for processed agri-food).

<Table 4-3> Classification of agri-food exporters type

<table>
<tr><th>item(production)
Type
Scale</th><th>fresh produce</th><th>processed agri-food
(direct production)</th><th>processed agri-food
(Consigned production)</th></tr>
<tr><td># of employees with below 10</td><td rowspan="2">(A) exporting only fresh produce
(NA = 129)</td><td>(B1) direct production, processing, & export
with below 10 (NB1 = 120)</td><td rowspan="2">(C) Consigned production for processing, and export
(NC = 110)</td></tr>
<tr><td># of employees with above 10</td><td>(B2) processed direct production export
With 11 or more (NB2 = 141)</td></tr>
</table>

Source: Author generated.

1.1. Characteristics of agri-food exporters' penetration into overseas markets

The export characteristics of agri-food exporters' penetration into overseas market were analyzed from the perspective of reasons for overseas market penetration, difficulties when entering new markets, and the method of setting the overseas market price. First, it was found that 'revenue and profits increase' is the #1 objective for the agri-food exporters' overseas

market penetration in general. This was followed in order by ‘securing global competitiveness’ and ‘avoiding a limited domestic market and excessive competition’. It was determined that the foregoing three reasons were the major ones for each exporter type as well, yet they had different characteristics by type. For the fresh agricultural products exporters (A), it was found that the ratio of responses for ‘avoiding a limited domestic market and excessive competition’ and ‘diversification of risks (supply, price) for domestic market’ had a higher ratio of responses compared to other types. For relatively large-scale companies in Type B2, C, although the share of ‘revenue and profits increase’ for the objective of the overseas market penetration was high, it was found that ‘securing global competitiveness’ was a similarly important reason for overseas market penetration by the processed agri-food export (B1, B2, C) companies compared to the fresh agricultural products export (A) companies.

<Table 4-4> Reasons for agri-food exporters’ overseas market penetration

unit: %

subject		Securing global competitiveness	Differentiated product development appropriate for overseas market	revenue and profits increase	Avoiding limited domestic market and excessive competition	diversification of risks(supply, price) for domestic market’	others	Total
Entirety		28.1	16.7	30.4	18.1	4.7	2.0	100.0
By type	A	23.0	14.6	29.7	21.7	8.0	3.1	100.0
	B1	30.1	19.2	28.6	17.7	4.4	0.0	100.0
	B2	29.6	15.9	31.8	18.0	3.0	1.7	100.0
	C	30.4	17.5	31.6	14.0	2.9	3.5	100.0

Note 1) A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

2) Results with duplicated answers of the 1st and 2nd choices were also counted.

Source: Author generated based on the corporate surveys (2018. 8.) for analysis of agri-food firms’ export strategy.

Next the difficulties faced by companies when penetrating new markets were examined. From the entire surveyed group of agri-food exporters, 73.4% had plans for penetrating new markets and the rest did not have a

plan. It is found that the difficulties experienced when penetrating new markets are ‘finding new buyers’, ‘lack of market information’, ‘local marketing activities’, ‘Securing funds for export’, and ‘price competitiveness’ in that order., The proportion of responses regarding the ‘export logistics’ and ‘non-tariff barriers’ was very low. <Table 4-5>.

<Table 4-5> Experienced difficulties when penetrating new markets

unit: %

subject		finding new buyers	lack of market information	Securing funds for export	Local marketing activities	export logistics	non-tariff barriers	price competitiveness	others	Total
Entirety		25.9	25.2	13.2	21.8	4.9	1.1	6.8	1.1	100.0
By type	A	21.2	22.1	13.5	24.0	7.7	0.0	9.6	1.9	100.0
	B1	29.6	27.8	18.5	18.5	3.7	0.0	0.0	1.9	100.0
	B2	25.0	29.7	9.4	21.9	1.6	4.7	7.8	0.0	100.0
	C	34.1	22.7	11.4	20.5	4.6	0.0	6.8	0.0	100.0

Note 1) A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

2) Results with the duplicated answers of the 1st and 2nd choices were also counted.

Source: Author generated based on the corporate surveys (2018. 8.) for analysis of agri-food firms’ export strategy.

Examining the responses by type of company revealed that the fresh product exporters (A) had more difficulty with ‘local marketing activities’ and ‘price competitiveness’ compared to other types of export companies. Whereas a relatively high portion of the Type B1 or B2 export companies that directly produced products had ‘lack of market information’ issues. The Type C companies had more difficulty in ‘finding new buyers’ when penetrating new markets compared to the other types of companies.

Meanwhile, 26.6% of survey subjects answered that they had not considered new market penetration. When asked the major reasons why not, the most common responses from the survey group as a whole were ‘focusing on previous market’ and ‘non-tariff barriers’. Breaking the responses down by company type showed that ‘focusing on previous market’ was the primary reason for Type A fresh product companies, whereas ‘non-tariff bar-

riers' was the primary reason for companies exporting processed goods (B1, B2, C). As for the rest of the reasons, 'lack of market information', 'Profitability on investment', and 'burden of initial investment cost' in order accounted for a high portion of the answers.

<Table 4-6> Reasons not to consider new market penetration

unit: %

Subject		Focusing on previous market	lack of market information	Burden of initial investment cost	Profitability on investment	Lack of export volume	non-tariff barrier	others	Total
Entirety		26.5	18.1	12.3	15.4	1.8	25.7	0.3	100.0
By type	A	38.2	18.2	15.5	12.7	2.7	12.7	0.0	100.0
	B1	24.1	19.5	14.9	12.6	2.3	26.4	0.0	100.0
	B2	22.8	20.2	8.8	16.7	1.8	29.8	0.0	100.0
	C	18.6	14.0	10.5	19.8	0.0	36.1	1.2	100.0

Note 1) A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

2) Results with the duplicated answers of the 1st and 2nd choices were also counted.

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

The agri-food export price is an important variable in determining export strategy, and it directly affects the profitability of exporters. It was found that the main methods of setting the overseas market price for a company are: 'considering the price level of local market competition products', 'production cost and proper margin', 'adjustment for local demand', and 'adjustment with Local importer's demand' in order. Examining the results by type of company revealed that Type A and C companies answered 'considering the price level of local market competition products' and 'adjustment for local demand' the most. In addition, it seems that the Type C companies conduct more strategic price discounting compared to the other types. The analysis also revealed that the Type B1 or B2 companies, which directly produce and export, weigh 'production cost and proper margin' more in setting their price as compared to other types of companies. However, the results of Type A companies' answer for the fresh produce

must be interpreted in light of the fact that the market price for some export items is set according to relevant laws.

<Table 4-7> Setting the overseas market price by agri-food exporters

unit: %

subject		production cost and proper margin	considering the price level of local market competition products	adjustment for local demand	Adjustment with Local importer's demand	strategic price discount	others	Total
Entirety		25.9	29.7	19.5	16.4	8.2	0.3	100.0
By type	A	23.2	32.9	21.3	15.7	6.5	0.5	100.0
	B1	30.0	29.5	17.0	15.5	8.0	0.0	100.0
	B2	28.0	26.2	18.8	18.4	8.7	0.0	100.0
	C	21.9	30.6	21.3	15.6	10.0	0.6	100.0

Note 1) A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

2) Results with duplicated answers of the 1st and 2nd choices were also counted.

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

1.2. Global competitiveness and export performance of agri-food exporters

Next, we examined how the surveyed agri-food exporters evaluated their global competitiveness and export performance. The exporters' global competitiveness was examined focusing on the major product,[26] while the subjective evaluation and their level of satisfaction were queried and then used for evaluation of export performance.

The levels were evaluated with the Likert 5-point scale and then converted to a 100-point system. It was found that the survey subject compa-

[26] The outlook for major export item's global competitiveness of food exporters, export performance and satisfaction level for the recent 3 years, growth in domestic and overseas markets, and product competitiveness are evaluated using Likerts 5-point scale (1=very low, 5=very high) and then converted to 100-point system.

nies evaluated their major export items' global competitiveness at about 70 points, whereas the quality, technology, and production cost competitiveness in order were evaluated as high or very high. Evaluating them across company type shows similar scores, except for the small-scale processed agri-food exporters (B1) who evaluated their global competitiveness as relatively low.

<Table 4-8> Evaluation of global competitiveness by agri-food exporters

unit: %, point

subject			very low	low	average	high	very high	global competitiveness
Entirety		quality	2.0	7.2	36.2	43.4	11.2	72.5
		production cost	1.2	11.8	40.8	37.4	8.8	68.2
		technology	2.0	6.0	32.4	46.6	13.0	70.9
By type	A	quality	0.8	4.7	31.8	51.2	11.6	73.6
		production cost	0.0	10.9	45.7	35.7	7.8	68.1
		technology	0.8	7.8	34.9	48.1	8.5	71.2
	B1	quality	4.2	9.2	33.3	42.5	10.8	69.3
		production cost	2.5	10.0	41.7	40.0	5.8	67.3
		technology	3.3	10.0	38.3	37.5	10.8	68.5
	B2	quality	1.4	4.3	31.9	50.4	12.1	73.5
		production cost	0.7	12.1	39.7	39.0	8.5	68.5
		technology	1.4	5.7	36.9	45.4	10.6	71.6
	C	quality	1.8	6.4	32.7	40.9	18.2	73.5
		production cost	1.8	14.6	35.5	34.6	13.6	68.7
		technology	2.7	5.5	34.6	41.8	15.5	72.4

Note 1) A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

2) global competitiveness is evaluated with the Likert 5-point scale (1=very low, 5=very high), then converted to 100 point system.

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

Next, we examined the scores given for the export performance of the companies for the past 3 years <Table 4-9> and the degree of satisfaction level <Table 4-10>. The levels were evaluated with the Likert 5-point scale and then converted to a 100-point system. The degree of satisfaction was approximately 58 points, and it was evaluated relatively high given the perspective of growth rate of export. Specifically, it was found that the fresh exporters (A) displayed a relatively higher export performance evaluation and satisfaction level than the processed exporters (B1, B2, C). On the other hand, the processed product exporters answered 'very low' for the market share whose score is higher than the average of evaluated companies.

<Table 4-9> Export performance evaluation of agri-food exporters

unit: %, point

subject			very low	low	average	high	very high	export performance
Entirety		export yield	5.4	21.8	47.6	22.8	2.4	59.0
		market share	9.6	24.6	41.2	21.8	2.8	56.7
		growth rate of export	6.4	21.4	40.8	28.0	3.4	60.1
By type	A	export yield	5.4	18.6	48.1	26.4	1.6	60.0
		market share	4.7	20.2	42.6	29.5	3.1	61.2
		growth rate of export	6.2	16.3	36.4	38.8	2.3	62.9
	B1	export yield	5.8	20.0	46.7	25.0	2.5	59.7
		market share	11.7	25.0	41.7	20.0	1.7	55.0
		growth rate of export	5.8	24.2	40.0	26.7	3.3	59.5
	B2	export yield	5.7	22.0	44.7	24.1	3.6	59.6
		market share	11.4	28.4	36.9	21.3	2.1	54.9
		growth rate of export	7.8	19.2	43.3	24.8	5.0	60.0
	C	export yield	4.6	27.3	51.8	14.6	1.8	56.4
		market share	10.9	24.6	44.6	15.5	4.6	55.6
		growth rate of export	5.5	27.3	43.6	20.9	2.7	57.6

Note 1) A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

2) The export performance is evaluated with the Likert's 5-point scale (1=very low, 5=very high) criteria then converted to 100-point system.

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

<Table 4-10> Degree of satisfaction on export evaluation of agri-food exporters

unit: %, point

subject			very low	low	average	high	very high	Degree of satisfaction on export
Entirety		export yield	5.6	23.0	46.6	20.8	4.0	58.9
		market share	9.0	24.2	43.6	19.8	3.4	56.9
		growth rate of export	7.2	19.8	42.0	28.0	3.0	60.0
By type	A	export yield	6.2	20.9	45.7	24.8	2.3	59.2
		market share	5.4	17.1	48.8	24.8	3.9	60.9
		growth rate of export	7.0	13.2	40.3	37.2	2.3	63.0
	B1	export yield	5.8	20.8	47.5	22.5	3.3	59.3
		market share	9.2	24.2	45.0	19.2	2.5	56.3
		growth rate of export	5.8	22.5	45.0	23.3	3.3	59.2
	B2	export yield	6.4	22.0	44.0	19.9	7.8	60.1
		market share	11.4	27.0	39.0	20.6	2.1	55.0
		growth rate of export	8.5	19.2	42.6	27.0	2.8	59.3
	C	export yield	3.6	29.1	50.0	15.5	1.8	56.5
		market share	10.0	29.1	41.8	13.6	5.5	55.1
		growth rate of export	7.3	25.5	40.0	23.6	3.6	58.2

Note 1) A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food

2) Degree of satisfaction on export was evaluated with the Likert 5-point scale (1=very low, 5=very high), then converted to 100-point system.

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

1.3. Experience in participating in export support programs by agri-food exporters

The efficacy or satisfaction level on the experience in participating in export support programs by agri-food exporters was evaluated and the level of participation was examined. The efficacy and satisfaction level were evaluated with the Likert 5-point scale and then converted to 100-point system. The level of participation was measured by the ratio of the number

of exporters participating in export support programs over the total of survey participants.

The results of the survey on the level of agri-food exporters' participation in export support programs are as follows. It was found that the entirety and processed agri-food exporters had a relatively high level of participation in the following support programs: local government's export support programs, participation in international exhibitions, KOTRA export support programs, SMBA's enhancement of export competences, SMBA's support of SME's acquiring overseas standards certifications, overseas certification registration, export conference for inviting buyers, and export logistics cost support. However the viewed efficacy or satisfaction level for local government's export support programs, KOTRA export support programs, SMBA's enhancement of export competences, SMBA's support of SME's acquiring overseas standards certifications, and so forth are relatively low compared to the relevant level of participation. It was also found that the level of participation for the fresh agricultural products exporters is high in order of export logistics cost support, local government's export support programs, support for participating international exhibitions, export conference for inviting buyers, and export specialized complex arrangement training.

<Table 4-11> Level of participation for export support programs by agri-food exporters

by type agri-food firms / export support programs	Entirety	A	B1	B2	C
① support for participating international exhibitions	45.8	36.4	57.5	51.8	36.4
② export conference for inviting buyers	33.4	27.1	40.8	41.1	22.7
③ support for setting up overseas antenna shops	4.0	1.6	6.7	6.4	0.9
④ frontier for market diversification	11.6	7.8	12.5	14.2	11.8
⑤ K-Food Fair	18.2	12.4	22.5	19.9	18.2
⑥ support overseas promotion events	19.2	24.8	18.3	18.4	14.5
⑦ promote strategic items for export to China	5.2	0.8	7.5	9.2	2.7
⑧ mobile application for matching buyers	4.8	3.1	5.8	7.8	1.8
⑨ promote integrated export organization	8.0	20.2	3.3	4.3	3.6

(continue)

by type agri-food firms / export support programs	Entirety	A	B1	B2	C
⑩ promote infra for export leading organizations	7.2	20.9	1.7	2.8	2.7
⑪ support export merchandising	15.0	14.7	11.7	20.6	11.8
⑫ support promotion to grow global brand	5.0	5.4	4.2	6.4	3.6
⑬ collaboration marketing with stars for agri-food	1.6	0.8	1.7	2.8	0.9
⑭ export logistics cost support	37.4	66.7	28.3	29.1	23.6
⑮ activate joint air logistics	7.2	10.9	2.5	7.1	8.2
⑯ overseas joint logistics center	1.2	0.8	0.8	2.1	0.9
⑰ Establishing cold-chain in China	1.0	0.0	1.7	2.1	0.0
⑱ support utilization of FTA preferential tariff	9.4	10.1	9.2	10.6	7.3
⑲ support customs clearance and logistics for sample	9.8	5.4	8.3	13.5	11.8
⑳ support export insurance	21.8	23.3	23.3	22.0	18.2
㉑ support overseas certification registration	32.0	17.1	40.8	44.0	24.5
㉒ export specialized complex arrangement training	9.0	26.4	3.3	2.8	2.7
㉓ support test expense for pesticide residue	9.0	24.8	1.7	5.7	2.7
㉔ Support test expense for food hygiene	5.0	7.8	4.2	5.0	2.7
㉕ support freshness preservation system	5.2	14.0	0.8	3.5	1.8
㉖ Information on agricultural and fishery products (KATI)	10.0	13.2	10.0	10.6	5.5
㉗ support consulting on expanding export	15.6	18.6	18.3	13.5	11.8
㉘ support localization	15.2	11.6	18.3	19.1	10.9
㉙ Enhancing SME's export competences (SMBA)	38.0	20.2	37.5	46.8	48.2
㉚ Support SME's acquiring overseas standards certifications (SMBA)	33.2	17.1	30.0	41.8	44.5
㉛ KOTRA export support programs	42.0	24.0	39.2	51.1	54.5
㉜ local government's export support programs	48.4	44.2	46.7	54.6	47.3
Max	48.4	66.7	57.5	54.6	54.5
Min	1.0	0.0	0.8	2.1	0.0

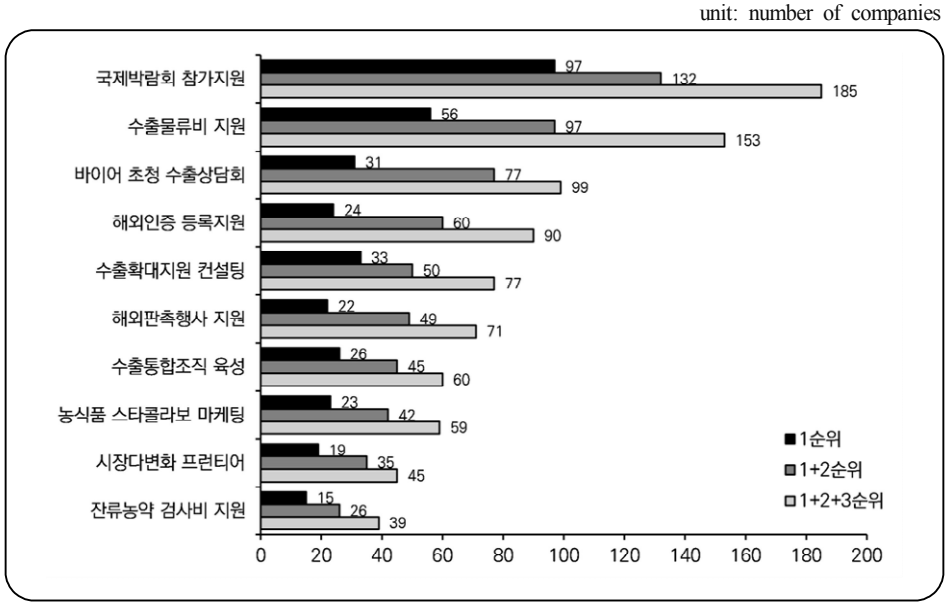
Note: The level of participation was measured by the ratio that the number of exporters participating in export support programs on the total of survey subject agri-food exporters.
Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

Next we surveyed which programs need to be expanded from the perspective of export support programs' importance. All the agri-food exporters answered that the support for participating international exhibitions

(1^{st} choice 97 companies, 1^{st}+2^{nd} choice 132 companies, 1^{st}+2^{nd}+3^{rd} choice 185 companies), export logistics cost support (1^{st} choice 56 companies, 1^{st}+2^{nd} choice 97 companies, 1^{st}+2^{nd}+3^{rd} choice 153companies), and export conference for inviting buyers (1^{st} choice 31companies, 1^{st}+2^{nd} choice 77 companies, 1^{st}+2^{nd}+3^{rd} choice 99 companies) were important in this in order.

<Figure 4-1> Survey results for expansion wanted export support programs

unit: number of companies



Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

1.4. Evaluation of a CEO's export expertise for agri-food export companies

A CEO's expertise in global management can grow a company to be an exporter by enhancing the efficiency and concentration of exports, and working together with the export organization's competencies. Each CEO's expertise in exports was evaluated by the level of understanding of the export item's export market performance and local markets, expertise in the

export process, acknowledgement of establishing strong relationships with buyers, and the ability to respond swiftly and accurately to an export crisis.

We found that Type C companies, which are consigned production exporters for processed agri-food, scored the highest with the answer of 'know well' on all the expertise items implying that CEOs of Type C companies have the highest expertise. The second highest was from Type A companies, which export only fresh produce, followed by type B2, which directly produce and export processed agri-food, and Type B1 in that order. These results suggest that the CEOs from medium-size exporters (Type B2) have relatively higher expertise than those from small-scale exporters (Type B1).

The success of consigned production exporters for processed agri-food (Type C) relies more on export performance than production since they are export specialized companies. Therefore, CEOs of Type C companies have relatively higher expertise than the other company types. Since Type B1 and B2 companies include companies that directly produce goods but are not directly involved in exports, their CEO's level of expertise on average was evaluated relatively low.

<Table 4-12> Evaluation on CEO's expertise of agri-food exporters

unit: %

expertise	corporate type	know nothing	know almost nothing	average	know well	know very well	Total
Understanding export marketability	A	0.0	2.3	25.6	31.0	41.1	100.0
	B1	1.7	2.5	38.3	40.8	16.7	100.0
	B2	0.7	2.1	30.5	40.4	26.2	100.0
	C	0.9	0.9	20.9	41.8	35.5	100.0
export works	A	0.0	4.7	34.9	24.8	35.7	100.0
	B1	1.7	12.5	40.8	30.8	14.2	100.0
	B2	1.4	4.3	43.3	29.1	22.0	100.0
	C	1.8	1.8	29.1	35.5	31.8	100.0
Understanding local market	A	1.6	4.7	33.3	25.6	34.9	100.0
	B1	5.8	12.5	35.8	35.8	10.0	100.0
	B2	2.1	6.4	34.0	34.8	22.7	100.0
	C	0.9	3.6	25.5	30.9	39.1	100.0

(Continued)

expertise	corporate type	know nothing	know almost nothing	average	know well	know very well	Total
Maintaining the relationship with buyers	A	0.8	6.2	28.7	30.2	34.1	100.0
	B1	4.2	5.0	39.2	33.3	18.3	100.0
	B2	1.4	7.1	33.3	34.0	24.1	100.0
	C	0.9	3.6	20.9	33.6	40.9	100.0
ability to respond to export crisis	A	0.0	9.3	30.2	26.4	34.1	100.0
	B1	5.0	10.0	43.3	32.5	9.2	100.0
	B2	1.4	7.8	39.0	31.9	19.9	100.0
	C	1.8	0.9	33.6	30.9	32.7	100.0

Note: A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

2. Export strategy analysis for agri-food firms

2.1. Analysis summary and methods

In this section we analyze the relationship between agri-food firms' export strategies and their export performance. Cavusgil and Zou (1994), Shoham (1998), Zou and Stan (1998), and Carneiro et al. (2016) are representative studies on a company's export performance. According to these studies, export value, export intensity, export profitability, growth rate of export, export sustainability (survival), and a company's subjective satisfaction level can all be considered part of export performance. Among these factors, the export intensity is most used universally, but various other indexes [27] are also used in this study since the industry types of the compa-

[27] Sousa(2004) organized 43 performance indexes used in the studies on the export performance, while the level of export concentration was most frequently used in

nies included in the data are heterogeneous.[28]

In this study, the export value from Cavusgil and Zou (1994), de Matteis et al. (2016), and Wagner (1995), the export intensity used in Sterlacchini (2001) and Wagner (2006), the export growth rate used in Cooper and Kleinschmidt (1985), the export sustainability used in Fugazza and Molina (2009) and Fu and Wu (2014) were all used for the indexes of export performance.

The data from the 'agri-food exporters survey' and aT 'export support programs performance' were utilized. First, the factors having effects on the export value, export intensity, and market diversification were examined. Then the export growth rate and export sustainability of company's export routes by unit were analyzed by combining the survey and the export support programs performance data.

2.2. Distinguishing effective export strategies (survey)

First, the Quasi-maximum likelihood estimation was used for the analysis of the survey, and then the conditional average was estimated as in the formula (15).

$$\mathrm{E}(y|\boldsymbol{x}) = m(\boldsymbol{x}\boldsymbol{\beta}) \tag{15}$$

y here means the export performance index, x is an explanatory variable, and β represents an estimated coefficient. The above conditional average was estimated by selecting proper function $m(\cdot)$ as per the manner of dependent variables. As the indexes of export performance, agri-food export value (EX) per employee, export intensity (EI), and the number of export countries (NC) were used. Since the export intensity has a value between

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the studies 16 times.

[28] The industry types included in the data were agriculture, manufacturing, and wholesale and retail industry.

0 and 1, the Probit function ($\Phi(\cdot)$) was used. The export per capita and market diversification index (number of export countries) does not have a negative value but a positive whole number value, thus the function ($\exp(\cdot)$) was used. According to Wooldridge (2010: 727-732) and Santos Silva and Tenreyro (2010) by applying the robustness covariance matrix to the generalized linear model, the export intensity was estimated by Quasi-maximum likelihood estimation (QMLE) using the Probit model. Then the export value and export countries were estimated by the Poisson's QMLE.[29]

<Table 4-13> basic statistics for surveyed companies (N=500)

	Average	Standard deviation	Minimum value	Maximum value
export intensity	0.22	(0.29)	0.00	0.96
export value per capita(thousand US$)	225.32	(710.92)	0.00	6996.12
# of export countries	3.52	(8.78)	0.33	23.33
# of employees	68.79	(315.87)	1.00	445.50
# of years for biz	16.73	(13.60)	2.00	73.00
# of the years of export experience	9.35	(8.24)	2.00	59.00
# of participated export support programs	5.29	(3.97)	0.00	32.00

Source: The author generated based on the corporate surveys (2018. 8.) for agri-food firms' export strategy analysis

First, it was found that the years of export experience have a positive (+) correlation for all performance indexes and at 10% significance level. In other words, export performance increased as the years of export experience increased. But the number of employees (scale) did show a negative (-) correlation with export value and export intensity. This may be related to the tendency for increased turnover as the corporate scale gets bigger. In other words, this can be interpreted that the turnover increase as per the relevant scale would be bigger than the increase in export value. On the other hand,

[29] The method such as the negative binomial regression has a demerit that a coefficient changes as per the scale of dependent variables, and has discorded estimator if it does not satisfy with additional assumptions compared to the Poisson's QMLE.

the analysis showed that the number of export countries did have a tendency to increase as the number of employees increased.

The extent of a company's participation in government, institutions, local government's export support programs was used as a proxy variable for positivity towards export. Our analysis showed that an increase in the number of participated support programs did have a positive (+) correlation with the export value and the number of export countries, thus implying that the export value per capita and number of export countries would increase as the company's positivity towards export increases.[30]

Next, the relationship between export strategy and export performance of a company was examined. The strategies that had statistically significant positive (+) effects on the increase of export value per capita were 3 (Pursuing functionality), 38 (utilization of co-brand), 53 (Securing stable export volume), and 54 (export insurance). It seems that emphasizing the functionality of a product was a natural result, as the demands for increased functionality in products is a recent big trend in the overseas markets. In addition, it seems that utilization of a co-brand had positive effects on the increase in export owing to increased market awareness. The results that factors such as securing export volume, export insurance, and FX risk management had significant positive (+) relations with an increase in export value coincided with expectations, because they are the strategies that directly correspond to the risk of export value loss. On the other hand, the analysis showed that the following strategies including 6 (customized production), 13 (overseas Korean focused), 29 (quality management system), 35 (safety, hygiene test system), 39 (field survey for market penetration), and 40 (securing buyers in exhibitions) would decrease the export value per capita. In other words, the strategies for the specific target consumers such as overseas Koreans or customized production may not be effective for expanding the scale of export value per capita.

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30 The number of participation in export support programs did not show clear correlation with the number employees or the scale of turnover as the Pearson's correlation coefficient being below 0.05.

<Table 4-14> Analysis results for effects of company's export strategies on the agri-food export performance

dependent variables: performance index	(1)	(2)	(3)
	Export value	export intensity	number of export countries
	Estimated coefficient	Estimated coefficient	Estimated coefficient
ln(Experience in export)	0.44 [a]	0.38 [a]	0.58 [a]
ln(# of employees)	-0.81 [a]	-0.13 [a]	0.15 [a]
# of participation for export support programs	0.05 [c]	0.01	0.04 [b]
s1: Enhancing competitiveness of production cost	-0.45	0.02	-0.37 [b]
s3: Pursuing product functionality	0.52 [b]	0.06	-0.03
s6: Custom made production or make-to-order	-0.61 [b]	0.07	0.36 [b]
s7: Focusing on main export product(item)	-0.10	-0.01	0.34 [b]
s10: Targeting niche markets	0.20	-0.09	0.24
s13: Targeting overseas Koreans	-0.49 [b]	-0.18 [c]	-0.20
s15: Overseas market diversification is important	-0.30	-0.18 [c]	0.21 [c]
s28: Operating brand management dept.	-0.36	-0.14	0.50 [a]
s29: Establishing system for product quality management	-0.70 [b]	-0.11	-0.08
s33: Monitoring post management of export market	0.27	0.31 [a]	-0.33 [c]
s34: Acquiring certifications	-0.19	-0.24 [b]	-0.06
s35: Establishing system for dealing with food safety and sanitary inspection	-0.48 [c]	-0.28 [a]	-0.21
s36: Labeling product info in local language	0.20	0.19 [c]	0.36 [a]
s38: Utilizing joint/alliance/nation's brands	0.94 [a]	0.29 [b]	-0.32
s39: Conducting field surveys when entering into new overseas markets	-0.73 [a]	-0.21 [c]	0.28 [c]
s40: Securing local buyers by export consultation via exhibitions	-0.69 [a]	-0.05	0.08
s43: Conducting own local market advertisement and PR	-0.08	0.12	0.28
s47: Liaising/collaborating with local distributors	0.05	0.23 [b]	0.08
s49: Utilizing air transport	0.07	0.28 [c]	-0.10
s50: Establishing cold-chain system for export logistics	0.18	0.08	-0.15

(Continued)

dependent variables: performance index	(1)	(2)	(3)
	Export value	export intensity	number of export countries
	Estimated coefficient	Estimated coefficient	Estimated coefficient
s53: Securing stable export volume	0.84 [a]	0.14	0.05
s54: export insurance	0.58 [a]	0.21 [b]	0.13
s56: FX risk management	0.59 [b]	0.13	0.24
s57: R&D investments	-0.20	-0.12	0.29 [b]
s62: Establishing and managing mid & long-term export plans	0.42	-0.16	-0.12
s65: Training export personnel	0.15	-0.29 [a]	-0.07
Constant term	5.86 [a]	-0.99 [a]	-1.64 [a]
Observed value	488	488	492

Note: The standard errors used the robust standard errors, and each a, b, c means the significance level of 1%, 5%, and 10% respectively.
Source: Author generated.

The strategies that had positive (+) correlations with export intensity included 33 (monitoring and post management), 36 (Labeling in local languages), 38 (utilization of co-brand), 47 (local distribution collaboration), 49 (Utilizing air transport), and 54 (export insurance). In other words, export intensity may be increased if a company increases the consumer's product awareness in the import country markets by labeling product information in local languages, utilization of co-brands, and managing time delays in logistics stages through local distribution collaborations and air shipment. In addition, continuous post management and using export insurance would be efficient for improving export intensity by coping with unexpected export environmental changes. On the other hand, strategies including 13 (Targeting overseas Koreans), 15 (overseas market diversification), 34(Acquiring certifications), 35 (safety, hygiene test system), 39 (field survey for market penetration), and 65 (Training export personnel) showed negative (-) relations with the export intensity.

The strategies that had a positive (+) relationship with the market diversification (number of export countries) index include: 6 (customized pro-

duction), 7 (Focusing on main items), 15 (overseas market diversification is important), 28 (dedicated brand management dept.), 36 (Labeling in local languages), 39 (field survey for market penetration), and 57 (R&D investments). It was found that the strategies for products and markets in general have effects on expanding the number of export destination countries. The preferences and criteria for agri-food by import country vary from the hygiene standpoint. Therefore, it would be efficient that a company pursues after production activities reflecting the demands and criteria of the import countries. Then continue to apply the criteria of the various countries while still focusing on the previous major items and penetration strategy. On the other hand, it was analyzed that 1 (enhancing production cost competitiveness) and 33 (export market monitoring) have negative (-) relations with the market diversification.

In the analysis of the entire company sample, the conclusion drawn was that the relations between strategies and performances showed different effects depending upon the type of performance while some strategies would have negative effects on export performance. The strategies focused on management of export risks and increased market awareness of product were generally efficient for improving the performance if export value and export intensity were used as the performance indexes. Especially, the risk management strategies for export value loss had statistically significant positive (+) relations with the export value increase. Similarly, the strategies regarding logistics or distribution had statistically significant relationships with the improvement of export intensity. On the other hand, the strategies that come with the burden of high costs such as investment strategies, facilities or system development from the mid & long-term perspective, and targeting specific consumers such as overseas Koreans would have negative (-) effects on export value and export intensity in the short-term so it is advised to pay more attention and be critical when selecting a strategy.

Nonetheless, it was also found that the strategies (focusing on major products, operating dedicated brand management dept. and field survey, and R&D investments) that do not have significant effects or negative (-) effects on the export value or export intensity would have positive (+) relations with the expanding export countries.

2.3. Identifying effective export strategies (combining surveys and export support performances)

The export performance by country and item was previously determined for each year using aT's logistics cost support performance data, but the company characteristics or management strategies cannot be identified using this data. Conversely, information on the detailed export performances of the agri-food firms would be difficult to obtain using surveys, but qualitative information such as export related decision making or strategy, and the participation method in the supply chain including produce, process and export can be obtained by survey. By combining two different sets of data together, more precise evaluation of the factors and strategies that have effects on the export performances of company is possible. Therefore, effective export strategies were analyzed in depth by combining the performance data for logistics cost support and the surveys in this paragraph.

From the 2005~2017 performance data for logistics cost support a total of 159 companies were identified which had answered the surveys of 762 companies with concrete export performance[31]. In order to combine the logistics cost performance data and the survey data, the formats of the two data sets were reconciled. Since the former is time series data, and the latter is cross-sectional data, the export performance data for support costs was converted to cross-sectional data. For the conversion, ① the export sustainability period (the number of years) and ② the rate of increase for annual average export value for the continuing period by company, which are the variables for export performance of the company, were calculated using the performance data for logistics cost support. However, two kinds of sample data were established by distinguishing the export performance variables with export market area and product item rather than merging it as one figure. In order to establish the data by area and item, we categorized the most recent period being maintained for individual export routes after aggregating export routes into 6 areas and 11 item groups by year of companies from the performance data of logistics cost support. Then each of the

[31] The time series based support performance for export logistics costs.

observed values were defined as 'continuing export routes by area' and 'continuing export routes by item. The observed values for 2 kinds of individual continuing export routes have variables such as: annual average export growth rate (Gex), years of continuing export ($Nexcu$), average export value (Mex), average unit cost for export ($Mexup$), number of export routes creation (re-entry) (Nsp), total year of export ($Nexu$), the 1st year's export value for the export routes (Fex), rate of average export ($Msubs$), whether cut in the left side (whether created in 2005) ($lcensor$), and cut in the right side (whether created in 2017) ($rcensor$) for the relevant period. The final empirical analysis samples were established by connecting the observed values of these two kinds of data regarding continuing export routes to the survey answers from the 159 companies. The main factor variables for export performance were whether to select company's export decision-making and detailed strategies identified in the surveys. <Table 4-14> and <Table 4-15> illustrate the 670 samples for continuing export routes by area, and the distribution of creation/stop by year for the 275 samples by item.

<Table 4-15> Continuing export routes distribution by area for 159 agri-food firms

By area	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
2005	2	4		1		3		1	3			4	46	64
2006		3	1			1						1	10	16
2007			4	1		6	1	2				2	6	22
2008					3	1	4				1	1	12	22
2009					4	8	2		2				21	37
2010						7	3		1	2			22	35
2011							12	6	5	1	4	1	38	67
2012								13	2	2	4	4	30	55
2013									5	6	2	11	30	54
2014										8	7	8	31	54
2015											9	11	40	60
2016												42	70	112
2017													72	72
Total	2	7	5	2	7	26	22	22	18	19	27	85	428	670

Note: vertical axis implies the time at the creation of export routes whereas the horizontal axis implies the time at the stop of export routes.

Source: Author generated.

<Table 4-16> Continuing export routes distribution by item of 159 agri-food firms

By item	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
2005	3	2				4			1			1	27	38
2006		1		1		2							7	11
2007			3	1		3	1	1				2	2	13
2008				2	3	4	3						7	19
2009					1	6			1				8	16
2010						11	2						9	22
2011							2	2			2		17	23
2012								6	1	2		1	7	17
2013									1	1		1	9	12
2014										2	1		9	12
2015											8	2	10	20
2016												8	46	54
2017													18	18
Total	3	3	3	4	4	30	8	9	4	5	11	15	176	275

Note: vertical axis implies the time at the creation of export routes whereas the horizontal axis implies the time at the stop of export routes.

Source: Author generated.

2.3.1. Export strategy and increase in export

In order to analyze how the export strategy that a company selects effects export increase, a coefficient was determined by establishing an estimate equation like the formula (16) and applying the LSDV (least-squares dummy variables).

$$\begin{aligned} Gex_{fr} = {} & \alpha + \beta_1 \ln(Mex_{fr}) + \beta_2 \ln(Mexup_{fr}) + \beta_3 Nsp_{fr} + \beta_4 Nexcy_{fr} \\ & + \beta_5 \ln(Fex_{fr}) + \beta_6 Msubs_{fr} + \beta_7 Ngprog_f + \beta_8 Ngprog_f^2 \\ & + \beta_9 lcensor_{fr} + \beta_{10} rcensor_{fr} + \gamma_i \Sigma_{i=1}^{30} s_i + D_r + D_f \end{aligned} \quad (16)$$

Gex_{fr} is the rate of increase for annual average export value during the period that a $f$company continuously exists in the area for the r period. Each Mex_{fr} and $Mexup_{fr}$ respectively represents that average export value and average unit cost for export by the company. Nsp_{fr} shows the number of export routes creation (re-entry) of the company, while $Nexcu_{fr}$ and Fex_{fr} each respectively mean the total number of export years, and the initial value for export. $Msubs_{fr}$ is the average value accounting for the aggregate value of export logistics cost support received by company from the export value (average subsidy ratio for export). $Nsprog_{fr}$ is the average value for the number of times a company participated in export support programs for the period which the relevant export routes are maintained while the non-linear relationship between the variable of the quadratic term ($Nsprog_{fr}^2$) and export performance was also examined. $lcensor_{fr}$ means the cut in the left side dummy whereas $Rcensor_{fr}$means the cut in the right side dummy. From s_1 to s_{30} are the dummy variables representing various export strategy factors where the value would be 0 or 1 if the relevant strategy factor was selected in the survey. D_r is a dummy variable for area or item group while D_f is a dummy variable for a company.

The second row of <Table 4-16> shows the results of the above equation's estimate on the integrated export routes samples by area. The third row is the estimation results on the integrated export routes samples by item group. By considering that the coefficients of each strategy factor in the two estimation results are statistically significant, the strategies that have positive effects on export increase were: ① Focus on major export products, ② export after product purchase, ③ Utilization of FTA preferential tariff, and ④ stable securing export volume. The factors that have negative effects on export increase were: ① enhancing production cost competitiveness, ② custom made production (make-to-order), ③ procuring raw materials from the market or contract farming, and ④ operating dedicated department for brand or design. In addition, there was no strategy that had conflicted effects on export increase by item and area.

<Table 4-17> export growth rate and company's export strategies

Variable	dependent variables: annual average export growth rate(LSDV)			
	Data integrated export routes by area		Data integrated export routes by item	
	Estimate	Prediction error	Estimate	Prediction error
ln(Average export value)	6.101	4.912	-143.579	272.482
ln(Average unit cost for export)	20.408	11.636	719.025	515.545
Number of export routes creation(re-entry)	19.043	27.682	232.185	315.279
Total number of export	5.614	2.128	45.267	117.342
ln(initial export value)	-15.222	3.916	-932.218	338.015
Average subsidy ratio for export	2.406	3.497	29.022	53.828
the number of participation in export support programs	16.831	17.398	-196.824	235.508
(the number of participation in export support programs)^2	-0.645	0.649	7.265	13.126
cut in the left side dummy(criteria: 2005)	-24.103	24.455	1190.667	968.185
cut in the right side dummy(criteria: 2017)	30.111	4.929	1041.406	506.239
s1: Enhancing competitiveness of production cost	-77.634	20.965	-445.231	410.649
s3: Pursuing product functionality	-25.122	25.780	-1947.73	1856.071
s6: Custom made production or make-to-order	-1.587	34.143	-1183.100	336.605
s7: Focusing on main export product(item)	89.207	43.753	562.408	1104.053
s10: Targeting niche markets	45.678	42.572	-1474.220	1409.705
s13: Targeting overseas Koreans	22.359	55.846	-470.672	820.754
s15: Overseas market diversification is important	8.097	9.588	730.599	876.651
s18: partial process such as processing, merchandizing , or logistics consigned	-25.616	29.032	462.197	919.513
s19: export consigned to export agency	-48.791	33.801	672.796	1215.133
s21: Export after product purchase	55.302	18.628	1665.966	1021.887
s23: Procurement of raw materials (contract farming, other than the domestic market)	-35.777	12.768	-2043.850	1136.437
s26: Utilization of proof of origin and FTA preferential tariff	81.465	50.558	1654.660	704.465
s28: Operating brand management dept.	-26.367	13.057	-557.786	983.221

(continue)

Variable	dependent variables: annual average export growth rate(LSDV)			
	Data integrated export routes by area		Data integrated export routes by item	
	Estimate	Prediction error	Estimate	Prediction error
s29: Establishing system for product quality management	65.667	38.388	-888.573	1070.801
s33: Monitoring post management of export market	-9.673	36.781	-1463.290	741.594
s34: Acquiring certifications	10.918	19.643	438.851	954.480
s35: Establishing system for dealing with food safety and sanitary inspection	-28.765	29.662	1005.976	1110.906
s36: Labeling product info in local language	-9.280	23.227	446.526	764.864
s38: Utilizing joint/alliance/nation's brands	10.458	23.673	-803.575	1223.235
s40: securing buyers and export consultation, through exhibitions	-90.393	18.783	169.378	451.502
s43: own advertisement and PR for local market	28.107	13.451	-902.765	841.767
s47: Liaising/collaborating with local distributors	-5.163	14.543	609.241	674.686
s49: Utilizing air transport	-28.082	35.617	-2909.870	1667.486
s50: Establishing cold-chain system for export logistics	-14.403	21.431	363.438	821.334
s53: Securing stable export volume	8.405	24.235	2969.801	1424.333
s54: export insurance	-8.719	38.102	1343.025	728.197
s56: FX risk management	-35.049	20.561	-606.625	1097.564
s57: R&D investments	1.890	19.296	2416.073	1557.689
s62: Establishing and managing mid & long-term export plans	-84.205	42.594	-436.773	1485.927
s65: Training export personnel	0.484	29.715	-2371.31	1367.476
dummy variable	Area, Firm		Item group, companies	
explanatory power	R^2=0.29		R^2=0.70	
number of samples	350		210	

Note: Each a, b, c means the significance level of 1%, 5%, and 10% respectively.
Source: Author generated.

2.3.2. Export strategy and export sustainability

The Heckman's 2-step model was used to analyze how the export strategy selected by a company affected its export sustainability. Export routes stopped prior to 2017 and those routes still continuing were mixed in the samples of analysis subjects. Thus, the factors that have effects on the years of continuing export by conducting the cut regression analysis on the continuing export routes in the step 2 after estimating the factors having effects on export stop and whether continued in step 1. The selection equation (if continuing, $C_i = 1$, if stopped $C_i = 0$) of step1 on whether export sustainability for each export route ($i = 1, 2, \cdots, N$) to be maintained, and the regression equation for the years of continuing export(y_i) of step2 is the formula (17).

$$\text{<step1>}\quad C_i = Z_i\gamma + \varepsilon_i \tag{17}$$
$$\text{<step2>}\quad y_i = X_i\beta + \beta_\lambda \hat{\lambda}_i + u_i$$

Z_i here is the explanatory variable vector having effects on export sustainability whereas X_i is the explanatory variable vector having effects on the years of continuing export. $\hat{\lambda}_i$ is the parameter of the Inverse Mill's Ratio($IMR = \phi(Z_i\hat{\gamma})/\Phi(Z_i\hat{\gamma})$) representing the bias of each export route obtained by the step1 estimation results.[32] The two error terms are independent from the each of the explanatory variable vectors and follows the bivariate normal distribution while the variance (σ_ε) of ε_i is assumed as 1. Under these assumptions, the step1 of Heckman's sample selection model was estimated by Probit and the step2 was estimated by the least-squares method because the selection of explanatory variable that connects the step1 and step2 is important. In other words, an instrument variable having effects on whether export stopped but not having effects on the years of continuing export was

[32] Each $\phi(\,)$, $\Phi(\,)$ are the standard normal probability density function and the standard normal probability cumulative density function as per the estimated results of step1.

necessary, while the step2 estimation results adjusted with the sample selection bias could be obtained by estimating with inclusion of $IMR(\hat{\lambda}_i)$ induced by the step1 estimation result, which includes the above instrument variable, when estimating step2.

In the empirical analysis, the independent variables previously used in export sustainability analysis were used as the instrument variables.[33] The second row of <Table 4-17> shows the results of the above equation's estimate on the integrated export routes samples by area. The third row of <Table 4-17> shows the estimation results on the integrated export route samples by item group. By considering that the coefficients of each strategy factor in the two estimation results were statistically significant and their directions were the same, the factors that have positive effects on export sustainability were: ① targeting overseas Koreans, ② export consigned to export agency, ③ obtaining certifications (GAP, HACCP, ISO, organic farming, environment friendly), ④ exposition or exhibitions utilized consultation and securing buyers, and ⑤ establishing and managing mid & long-term export plan. Whereas the factors having negative effects on export sustainability were: ① establishing quality management system for product standardization and uniformity, ② utilizing air transport, and ③ R&D investments. Nevertheless, there were no strategy factors that had statistically conflicted effects on export sustainability.

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[33] In order to resolve the issue of multicollinearity, the variables, which shall be included in the 1step estimate and excluded in the 2step estimate, were selected as the average export unit price ($Mexup$), number of export route (re-entry) creation (Nsp), and the total number of years for export ($Nexy$). Whereas the variables that shall be included in the 2step estimate and excluded in the 1step estimate were the average export value (Mex), the average number of participation in export support programs ($Nprog$) and the quadratic term of this variable.

<Table 4-18> Years of continuing export and company's export strategies

Variable	dependent variables: years of continuing export(Heckman's 2-step model)							
	integrated data for export routes by area step1(whether stopped) step2(number of continuing years)				integrated data for export routes by item group step1(whether stopped) step2(number of continuing years)			
	Estimate	Prediction error	Estimate	Prediction error	Estimate	Prediction error	Estimate	Prediction error
ln(Average export value)			0.806[a]	0.076			1.017[a]	0.211
ln(Average unit cost for export)	-0.033	0.056			0.064	0.256		
Number of export routes creation(re-entry)	-0.160	0.120			-0.808	0.556		
total number of export years	0.263[a]	0.025			0.371[b]	0.124		
ln(initial value for export)	0.035	0.027	-0.400[a]	0.087	0.056	0.118	-0.559[a]	0.198
Average subsidy ratio for export	-0.045[b]	0.019	0.061[c]	0.032	-0.148	0.113	0.224[a]	0.065
The number of participation in export support programs			-0.075	0.121			-0.015	0.187
(The number of participation in export support programs)^2			0.006	0.006			0.004	0.011
cut in the left side dummy(criteria:2005)	-1.130[a]	0.320	6.162[a]	0.384	-1.680	1.026	5.995[a]	0.595
s1:Enhancing competitiveness of production cost	0.308	0.226	-0.046	0.536	0.766c	0.463	-1.088[c]	0.603
s3:Pursuing product functionality	-0.126	0.180	0.941[b]	0.438	-0.330	0.533	0.503	0.701
s6:Custom made production or make-to-order	0.029	0.230	-0.033	0.422	0.293	0.727	-0.489	0.643
s7:Focusing on main export product(item)	0.187	0.204	-0.170	0.446	-0.021	0.598	-0.453	0.552
s10:Targeting niche markets	-0.446[a]	0.144	0.268	0.299	0.033	0.490	-0.322	0.437
s13:Targeting overseas Koreans	-0.262	0.205	1.548[a]	0.384	-0.533	0.553	0.827[c]	0.487
s15:Overseas market diversification is important	0.332[c]	0.170	-0.277	0.322	0.316	0.502	-0.530	0.550
s18:partial process such as processing, merchandizing , or logistics consigned	-0.311	0.205	1.336[a]	0.419	-0.441	0.561	0.784	0.616
s19:export consigned to export agency	-0.533[c]	0.272	2.499[a]	0.731	-1.527[c]	0.902	3.452[a]	1.014
s21:Export after product purchase	0.496[b]	0.214	-0.651[c]	0.346	0.563	0.506	-0.668	0.532

(continue)

Variable	dependent variables: years of continuing export(Heckman's 2-step model)							
	integrated data for export routes by area step1(whether stopped) step2(number of continuing years)				integrated data for export routes by item group step1(whether stopped) step2(number of continuing years)			
	Estimate	Prediction error	Estimate	Prediction error	Estimate	Prediction error	Estimate	Prediction error
s23: Procurement of raw materials(contract farming, other than the domestic market)	0.029	0.185	0.059	0.435	-0.308	0.635	0.765	0.513
s26: Utilization of proof of origin, FTA preferential tariff	-0.577[b]	0.251	0.834	0.681	-0.630	0.828	0.931	1.019
s28: Operating brand management dept.	-0.418[b]	0.200	-0.075	0.436	-0.840	1.146	0.618	0.785
s29: Establishing system for product quality management	0.280	0.200	-0.991[a]	0.353	0.389	0.582	-1.335[b]	0.523
s33: Monitoring post management of export market	0.218	0.152	-0.798[b]	0.348	-0.108	0.579	-0.362	0.539
s34: Acquiring certifications	-0.657[a]	0.224	1.947[a]	0.455	-1.008	0.826	2.116[a]	0.616
s35: Establishing system for dealing with food safety and sanitary inspection	0.144	0.185	-0.370	0.381	0.456	0.613	-0.375	0.623
s36: Labeling product info in local language	0.094	0.231	0.229	0.384	0.106	0.625	-0.373	0.557
s38: Utilizing joint/alliance/nation's brands	0.041	0.270	-0.538	0.483	0.702	1.032	-0.504	0.492
s40: securing buyers and export consultation, through exhibitions	-0.510[b]	0.217	1.090[a]	0.415	-0.769	0.582	1.697[a]	0.615
s43: own advertisement and PR for local market	0.141	0.162	0.148	0.287	0.399	0.689	-1.169[b]	0.528
s47: Liaising/collaborating with local distributors	0.409[c]	0.211	-0.835[b]	0.377	0.161	0.626	-0.062	0.573
s49: Utilizing air transport	0.905[a]	0.338	-1.550[a]	0.434	1.173	1.099	-1.126[c]	0.613

(continue)

Variable	dependent variables: years of continuing export(Heckman's 2-step model)							
	integrated data for export routes by area step1(whether stopped) step2(number of continuing years)				integrated data for export routes by item group step1(whether stopped) step2(number of continuing years)			
	Estimate	Prediction error	Estimate	Prediction error	Estimate	Prediction error	Estimate	Prediction error
s50: Establishing export logistics cold-chain system	0.363	0.223	-0.864[b]	0.401	-0.135	0.782	-0.328	0.585
s53: Securing stable export volume	-0.477[b]	0.189	0.776[b]	0.371	-0.793	0.729	0.945	0.617
s54: export insurance	-0.111	0.163	0.277	0.388	0.512	0.633	-0.498	0.427
s56: FX risk management	-0.471[b]	0.189	0.474	0.481	-0.030	0.653	-0.104	0.488
s57: R&D investments	0.058	0.208	-1.440[a]	0.465	0.339	0.882	-1.309[c]	0.709
s62: Establishing and managing mid & long-term export plans	-0.346[c]	0.182	1.047[a]	0.395	-0.335	0.739	1.185[b]	0.541
s65: Training export personnel	0.296	0.194	-0.827[b]	0.362	0.032	0.689	0.335	0.581
λ(Inverse Mill's ratio)			-4.307[a]	0.360			-4.289[a]	0.808
dummy variable	Area				item group			
explanatory power	Wald $\chi^2(41)$=2,382				Wald $\chi^2(36)$=744			
number of samples	668 (cut in the left side: 242)				273 (cut in the left side: 99)			
	μ= −1.0, σ=4.3				μ= −1.0, σ=4.3			

Note: Each a, b, c means the significance level of 1%, 5%, and 10% respectively.
Source: Author generated.

3. Identifying effective export strategies for companies by type (survey)

The management activities or the manner of business operations by companies would be very different as they select distinct export strategies for purchase of raw materials, production, processing and distribution, and marketing depending upon their handling of products. Case studies of excep-

tional companies were conducted to complement the limitation of quantitative analysis results and the results were utilized for interpretation. These excellent companies were selected comprehensively based on export performance (agri-food export value per capita, export intensity, number of export countries, and export sustainability), global competitiveness, and subjective export performance evaluation results of the companies.

Before describing the results of the analysis, the basic statistics of the variables for analysis of the companies by type are as shown in <Table 4-18>. The consigned production exporters for processed agri-food (Type C) had the largest average number of employees, followed then by the medium-size exporters for processed agri-food (Type B2), the fresh agricultural products exporters (Type A), and finally the small scale processed agri-food exporters (Type B1) in that order. The fresh agricultural products exporters and the small-scale direct production processed agri-food exporters had a smaller average number of employees than the entire average.

The small-scale processed agri-food exporters (Type B1) had the shortest average # of years for business with 10.6 years whereas each the medium-size exporters for processed agri-food (Type B2) and the fresh agricultural products exporters (Type A) average # of years for biz were long at 19.8 years and 18.5 years, respectively. The Type A exporters had the longest years of export then Type B2, followed by Type C in that order. The number of years for export of Type B1 was on average of 5.7 years, making it 40~50% lower than that of the other types.

The fresh agricultural products exporters (Type A) had an average of approximately KRW 400 million of export value per employee, making it higher than the rest of the group's averages. The medium-size exporters for processed agri-food (Type B2) had the largest number of export countries, followed by Type C, A, and B1 in that order.

Contrary to the expectation that the small-scale processed agri-food exporters (Type B1) had the most export intensity, it was the fresh agricultural products exporters (Type A) who had the highest export intensity. They were then followed by Type C, B2, and B1 in that order. Type B2 had the highest participation in export support programs with an average of 5.9, followed by Type A, B1, and C in that order.

The Type B1 companies had the shortest years of export on average and

the lowest market diversification index (number of export countries) and export intensity. They had higher export value per capita than the Type B2 but were lower than the other types.

<Table 4-19> basic statistics for companies by type

	A	B1	B2	C
	Average (Standard deviation)	Average (Standard deviation)	Average (Standard deviation)	Average (Standard deviation)
export intensity	0.43 (0.35)	0.09 (0.15)	0.15 (0.22)	0.20 (0.26)
export value per capita (thousand US$)	570.99 (1142.25)	131.84 (555.32)	38.28 (103.88)	169.22 (503.58)
# of export countries	2.83 (3.35)	1.79 (1.71)	4.87 (13.83)	4.50 (9.20)
# of employees	21.43 (47.09)	5.83 (2.61)	122.24 (390.51)	124.50 (494.39)
# of years for biz	18.53 (15.05)	10.59 (7.15)	19.82 (13.73)	17.35 (14.98)
# of years in export experience	10.80 (7.10)	5.74 (4.79)	10.62 (9.26)	9.96 (9.88)
# of participation in export support programs	5.32 (3.71)	5.19 (3.78)	5.91 (4.73)	4.59 (3.26)
# of companies within the type	129	120	141	110

Note: A-fresh agricultural products exporters, B1-small scale processed agri-food exporters, B2-Medium-size exporters for processed agri-food, C-Consigned production exporters for processed agri-food.

Source: Author generated.

Next, we examined which operative strategies were better for improving export performance by comprehensively assessing the analysis results, the survey answer data, and the interviews with the companies.

3.1. Fresh agricultural products exporters (Type A)

The companies which were classified as fresh agricultural products export companies (Type A) included NH (Unit of agricultural cooperatives), agriculture incorporated companies, agricultural association corporations, dedicated horticultural production complex, and fresh agricultural products spe-

cialized trade agencies. The major export item classes included fruits, vegetables, and mushrooms while the representative export items were pear, strawberry, paprika, and king oyster mushroom.

<Table 4-20> Strategy factors for fresh agricultural products exporters(Type A)'s performance index

fresh agricultural products exporters(Type A)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
ln(Experience in export)	0.48 [cc]	0.46 [a]	0.31 [a]
ln(# of employees)	-0.95 [a]	-0.12 [c]	0.17 [b]
# of participation for export support programs	0.07 [b]	0.03	0.02
s1: Enhancing competitiveness of production cost	-0.44	-0.15	-0.14
s3: Pursuing product functionality	0.62 [c]	0.53 [b]	0.10
s6: Custom made production or make-to-order	-0.39 [b]	0.03	-0.15
s7: Focusing on main export product(item)	0.37	0.08	0.55 [a]
s10: Targeting niche markets	-0.01	-0.02	-0.22
s13: Targeting overseas Koreans	-0.41	-0.19	0.23
s15: Overseas market diversification is important	-0.73 [a]	-0.61 [a]	0.20
s28: Operating brand management dept.	-0.01	-0.08	0.35 [c]
s29: Establishing system for product quality management	-0.24	-0.10	-0.24
s33: Monitoring post management of export market	0.13	0.21	0.16
s34: Acquiring certifications	0.46	0.19	0.18
s35: Establishing system for dealing with food safety and sanitary inspection	-0.95 [a]	-0.58 [b]	-0.51 [b]
s36: Labeling product info in local language	0.72 [a]	0.19	0.13
38: Utilizing joint/alliance/nation's brands	0.54 [c]	0.05	-0.29 [c]
s39: Conducting field surveys when entering into new overseas markets	-0.12	-0.01	0.28 [c]
s40: Securing local buyers by export consultation via exhibitions	-0.26	-0.09	0.39 [a]
s43: Conducting own local market advertisement and PR	0.01	0.00	0.15
s47: Liaising/collaborating with local distributors	-0.04	0.33 [c]	0.05
s49: Utilizing air transport	0.32	0.37	0.42 [b]
s50: Establishing cold-chain system for export logistics	-0.14	-0.53 [b]	-0.67 [a]

(continue)

fresh agricultural products exporters(Type A)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
s53: Securing stable export volume	-0.25	-0.20	0.16
s54: export insurance	0.35	0.43 [b]	-0.08
s56: FX risk management	0.42	0.58 [a]	0.26
s57: R&D investments	-0.35	-0.27	-0.06
s62: Establishing and managing mid & long-term export plans	0.49 [c]	0.12	-0.09
s65: Training export personnel	-0.38	-0.26	0.08
Constant term	6.17 [a]	-0.88 [a]	-0.82 [b]
Observed value	124	124	128

Note: The standard errors used the robust standard errors, and each a, b, c means the significance level of 1%, 5%, and 10% respectively.
Source: Author generated.

Our analysis showed that the strategy for pursuing functionality including health and beauty is effective for improving the fresh agricultural products export performance (export value per capita, export intensity).[34] Health functional food would be the first to come up for the food being emphasized with functionality. However, the results of analysis implied that a strategy emphasizing functionality would also positively improve the export performance of a company in the fresh agricultural products export. The strategy of emphasizing functionality suggests it is important to select and produce products with a high degree of functional contents in the production stage, or to conduct product advertisement that specifically highlights a product's relevant functionality.[35]

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[34] According to Korea's 'health functional food Act', the term 'functionality' means an attribute through which "one can receive useful effects for health purpose to control nutrition or physiological actions towards human organism and functions."

[35] Labeling the functionality phrase or advertising it shall be in compliance with the labeling system and restrictions on advertisement of import countries. Japan and the US, which are the major export destination countries for fresh produce, allow

It was found that the market diversification focused strategy had negative effects on export performance (export value, export intensity) in the short-term.

This may be a reflection of the aspect of trade that requires prior quarantine agreement at the country level for fresh agricultural product exports. The quarantine agreement between countries would normally take over 10 years. Thus it may have effects on export performance in the short-term since the quarantine requirements vary depending upon countries even if companies pursue strategic market diversification. As a result of actual interviews with the companies, it was found that while companies agree on the importance of market diversification, they are more focused on sustainability and export expansion in the major markets. It was found that the Type A companies의 37% of the Type A companies, who answered the company survey, utilize both the market diversification strategy and the focus on major markets strategy relatively more than the other types. Therefore, it was beneficial for improving the short-term export performance to focus on the management of major market and to secure more stable export markets from the standpoint of fresh agricultural product exports. Along with the above, strategies should be considered that seek opportunities of market diversification while monitoring pending issues regarding the quarantine settlement in the long-term perspective.

It was determined that the strategy of establishing a safety and hygiene test response system has negative (-) relations with all three of the export performance indexes. The safety and hygiene test response is the process or personnel that handle any issues that may take place during the tests prior to shipments or the process of import customs clearance. Generally the fresh agricultural product exports are not restricted for items that were produced and selected in accordance with the export quarantine requirements within the designated complex. It was initially expected that the safety and hygiene test response system would have positive effects on export performance due to the above points, but the results were the opposite.

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functionality labels on fresh produce as long as they are backed up scientific proofs.

According to the opinions from the companies about this result, the actual loss would occur by discarding the entire amount if the fresh produce exports are rejected by customs clearance due to not meeting the hygiene requirements, making it difficult to solve in the short-term.[36] In other words, it is important to thoroughly supervise the safety and hygiene criteria during the administration stage right after production and harvest rather than waiting and having to deal with a problem overseas in a reactive manner.

It was determined that establishing a cold-chain system strategy also has a negative (-) relationship with the export performance (export intensity, number of export countries). Based on the survey results, the average turnover of fresh agricultural product exporters (Type A) stating that they utilize the recently established cold-chain system strategy was higher than that of the companies stating that they do not.[37] Since the export intensity variable means the share of export value on turnover, the value becomes relatively smaller if the turnover is high. Also, a logistics system can be unsophisticatedly established for companies with a relatively small number of export countries. Besides, they may have little burden to utilize cold-chain. It seems that the strategy had a negative (-) relationship with the export intensity and the number of export countries. According to the in-depth survey responses from the companies, some of the companies felt burdened by the costs of low temperature storage and procuring or leasing refrigeration vehicles. Furthermore, the companies with the relatively low turnover scale would have difficulties in establishing a cold-chain system as substantiated by our survey results.

It was found that the co-brand (country, joint, united brand) strategy had positive effects on the improvement of export value per capita but had negative effects on the expansion of the number of export destination countries. When utilizing co-brand, it appears the improvement of export value was

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[36] The survey asked about the strategies that have been executed within the past 2~3 years. The companies which answered that they recently established a response system may experience a slump in export performance as per the issues of safety and sanitation reflecting the regression result.

[37] The portion of type A companies that answered that they established an export logistics cold-chain was 39%. Their average turnover is KRW 9.1 billion, whereas the turnover of companies stating they had ‘not established’ was KRW 8.1 billion.

due to the increased awareness in the country from co-marketing efficacy and Hanryu. On the other hand, it was assessed that the number of export countries increased when co-brand was not utilized. This may be because the possible countries to export to for fresh produce are limited, and the company's product distinctiveness cannot become prominent only by utilizing co-branding. The fresh agricultural products specialized exporters, who were visited for the survey, actually actively utilize the country brand such as K-berry, K-pear, and etc. together with the images showing the companies at the same time. In addition, as survey results indicated, the number of companies using their own brand from among the Type A companies was 55, which is more than double the number of companies using co-brand, which was 22. The number of companies using both co-brand and their own brands was 20.

3.2. Small scale processed agri-food exporters (Type B1)

The Type B1 companies are the companies with less than 10 employees among the processed food exporters, yet they directly produce their products.[38] Their major export items include processed food (fruits and vegetable juice, vegetable oil), ginseng, processed rice, and tea.

Our study showed that strategy of focusing on niche markets was effective for improvement of export performance (export value per capita, export intensity) <Table 4-20>. A niche market is a market made by targeting particular characteristics of consumption (Ex: organic farming food, baby food, etc.) as per the preferences of specific consumers. According to the survey results, companies focusing on a niche market accounted for 43% among the small scale processed agri-food exporters (Type B1), which is higher than 23% of companies having preference in securing large-scale markets. Companies utilizing both strategies accounted for almost 20%, but the majority of Type B1 companies were focused on a niche market.

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[38] It does not mean that all the export products are directly produced by one's own.

<Table 4-21> Strategy factors for small scale processed agri-food exporters (Type B1) by performance index

small scale processed agri-food exporters(Type B1)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
ln(Experience in export)	-0.47	0.28 [b]	0.59 [a]
ln(# of employees)	-0.94 [b]	-0.16	-0.05
# of participation for export support programs	0.17 [a]	0.02 [c]	0.02
s1: Enhancing competitiveness of production cost	0.48	-0.11	0.34 [c]
s3: Pursuing product functionality	0.80	-0.28	-0.06
s6: Custom made production or make-to-order	-1.48 [b]	-0.15	-0.19
s7: Focusing on main export product(item)	-0.48	0.03	0.13
s10: Targeting niche markets	1.12 [a]	0.28 [c]	-0.24
s13: Targeting overseas Koreans	-0.17	-0.05	-0.36 [b]
s15: Overseas market diversification is important	-0.74 [b]	0.02	0.41 [a]
s28: Operating brand management dept.	-0.30	0.32	0.20
s29: Establishing system for product quality management	-2.32 [b]	-0.15	0.10
s33: Monitoring post management of export market	0.38	0.45 [a]	0.06
s34: Acquiring certifications	-0.30	0.09	0.14
s35: Establishing system for dealing with food safety and sanitary inspection	-0.73	0.08	0.02
s36: Labeling product info in local language	0.55	0.34 [b]	0.21
s38: Utilizing joint/alliance/nation's brands	-1.67	-0.14	0.15
s39: Conducting field surveys when entering into new overseas markets	-0.87	-0.05	0.21
s40: Securing local buyers by export consultation via exhibitions	-1.44 [a]	-0.21	-0.32
s43: Conducting own local market advertisement and PR	-1.49 [b]	0.06	0.10
s47: Liaising/collaborating with local distributors	-1.13 [c]	0.03	-0.30
s49: Utilizing air transport	-0.03	0.51 [b]	0.33
s50: Establishing cold-chain system for export logistics	-1.65 [b]	-0.61 [a]	0.32
s53: Securing stable export volume	1.47 [b]	0.37 [b]	-0.09
s54: export insurance	0.28	-0.07	-0.08
s56: FX risk management	1.82 [b]	0.25 [c]	-0.22
s57: R&D investments	0.86 [b]	0.21	-0.07

(continue)

small scale processed agri-food exporters(Type B1)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
s62: Establishing and managing mid & long-term export plans	1.82 [a]	-0.43 [b]	0.06
s65: Training export personnel	0.80	-0.46 [b]	-0.28
Constant term	4.94 [a]	-1.95 [a]	-0.56 [c]
Observed value	117	117	117

Note: The standard errors used the robust standard errors, and each a, b, c means the significance level of 1%, 5%, and 10% respectively.
Source: Author generated.

It was determined that establishing a cold-chain system strategy has a negative (-) relationship with export performance (export value per capita, export intensity) while companies not establishing cold-chain strategy had a tendency to increase export performance. These results were reflected by the properties of the major export items of small-scale processed agri-food exporters (Type B1) that are mostly transportable at room temperature. The Type B1 companies not establishing a cold-chain strategy accounted for 80%, while the companies with a cold-chain strategy mainly export fermented paste varieties, Kimchi, and fruit juice. As mentioned when analyzing the fresh agricultural product exporters (Type A), establishing and using cold-chain facilities or vehicles may be burdensome for companies, so the strategy is primarily useful for companies of a certain scale or larger.[39]

It was revealed in our analysis that securing stable export volume and FX risk management were effective for improving export performance (export value per capita, export intensity). These strategies were effective for Type B1 companies, which are small scale, since the risk for securing export vol-

[39] As a result of survey, the companies using the established cold-chain strategy from the Type B1 have KRW 74.503 billion in average turnover (2015~2017 average) which is more than 15 times bigger than the KRW4.801 million for that of the companies without the strategy.

ume and FX changes is relatively big.

It was also found that the strategy for having mid & long-term export plans and their management had positive effects on the increase of export value per capita but negative effects on the increase of export intensity. It seems that the positive effects occurred because companies (from among the small scale companies) having mid & long-term export plans increased the short-term export value under stable circumstances, and they tended to have big turnover. The companies selecting this strategy among the small scale processed agri-food exporters (Type B1) were 3 times greater in export value, approximately 8 times bigger in turnover, and about 2% lower in export intensity than the companies that did not select this strategy.

The market diversification promoting strategies appeared to have opposite effects depending upon export performance. While diversification seemed effective for expanding the number of export destination countries, it had negative effects on export value per capita. In our actual interview with the companies (ginseng beverage exporters), it was found that small-scale companies focused on the current major export markets due to the issues of costs and labor involved in promoting market diversification. These results are in contrast with the results for the Type B2 companies (medium-size exporters for processed agri-food), which are larger in scale than B1 companies. In other words, focusing on current export markets for the short-term, rather than promoting market diversification, was more efficient at increasing export value for small-scale Type B1 companies.

3.3. Medium-size exporters for processed agri-food (Type B2)

The type B2 group is composed of rather larger scale companies than the B1. On average, the type B2 company had over 20 times the number of employees and 3.6 fold higher turnover compared to the Type B1. The medium-size exporters for processed agri-food (Type B2) mainly export processed products, Kimchi, ginseng, tea, processed rice, and so forth.

As a result of our analysis of medium-size exporters of processed agri-food (Type B2), it was revealed that the custom made made-to-order

strategy had positive effects on export performance (export intensity, number of export countries) <Table 4-21>. These results contrast with the analysis results for the Type B1 small-scale companies.[40] Considering the fact that the export volume at a certain level is already secured as well as the production infrastructure for the custom made, and made-to-order, this may not be the best strategic method for small-scale companies. On the other hand, the larger Type B2 companies are equipped with the facilities and infrastructure to produce in accordance with the requirements from manufacturing to the packaging stage. Also, it seems that the custom-made made-to-order product export strategy has positive effects on the improvement of export performance since the order volume would likely satisfy the proper level of company's desirable efficacy.

As mentioned above, focusing on a niche market strategy had negative effects on export performance (export value per capita, export intensity). These results were opposite to the analysis results for the Type B1 companies (small scale processed agri-food exporters). As a result of actual interviews, it seems that it would be difficult to show performance in the short-term by penetrating niche markets. The interviewed companies (rice wine export) used PR strategies to actively utilize social networks targeting young consumers in China, but explained that they did not generate notable profits from a short-term perspective. Therefore, securing broader consumer markets rather than a specific consumer group would be much more effective for improving export performance for the Type B2 (medium-size exporters for processed agri-food) companies from the standpoint of short-term performance. However, it seems that the companies primarily focused on securing large-scale markets but also targeted niche markets for expanding the base at the same time according to the survey results.

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[40] It was analyzed that the custom made, make-to-order strategy for the small-scale companies (B1) had a negative relationship (export value per capita) with export performance, or the strategy is not statistically significant (level of export concentration, number of export destination countries).

<Table 4-22> Strategy factors for medium-size exporters for processed agri-food (Type B2) by performance index

Medium-size exporters for processed agri-food(Type B2)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
ln(Experience in export)	0.61 [b]	0.22 [c]	0.49 [a]
ln(# of employees)	-0.70 [c]	-0.25 [b]	0.22 [b]
# of participation for export support programs	0.04	-0.01	0.01
s1: Enhancing competitiveness of production cost	-0.28	0.15	-0.65 [a]
s3: Pursuing product functionality	0.67	-0.17	0.36
s6: Custom made production or make-to-order	-0.01	0.56 [a]	1.29 [a]
s7: Focusing on main export product(item)	-0.21	-0.45 [b]	-0.13
s10: Targeting niche markets	-0.74 [b]	-0.30 [b]	0.17
s13: Targeting overseas Koreans	-0.65	-0.34 [b]	-0.21
s15: Overseas market diversification is important	1.12 [a]	-0.01	-0.03
s28: Operating brand management dept.	0.77	-0.08	0.11
s29: Establishing system for product quality management	-0.05	-0.09	-0.05
s33: Monitoring post management of export market	1.20 [c]	0.70 [a]	-0.06
s34: Acquiring certifications	1.15	-0.81	-0.91 [b]
s35: Establishing system for dealing with food safety and sanitary inspection	-1.21 [b]	-0.32	0.08
s36: Labeling product info in local language	0.35	0.59 [a]	0.33
s38: Utilizing joint/alliance/nation's brands	0.70	-0.38	-0.95 [a]
s39: Conducting field surveys when entering into new overseas markets	-1.17 [b]	-0.40 [c]	0.67 [b]
s40: Securing local buyers by export consultation via exhibitions	0.33	0.14	-0.12
s43: Conducting own local market advertisement and PR	0.46	0.23	0.59 [a]
s47: Liaising/collaborating with local distributors	0.27	0.46 [b]	0.48 [b]
s49: Utilizing air transport	-0.24	-0.20	-0.85 [a]
s50: Establishing cold-chain system for export logistics	0.57	0.21	-0.14
s53: Securing stable export volume	-0.03	0.02	-0.10
s54: export insurance	0.22	0.19	0.31
s56: FX risk management	-0.32	0.22	0.37 [c]
s57: R&D investments	1.44 [b]	-0.04	0.71 [a]

(Continued)

Medium-size exporters for processed agri-food(Type B2)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
s62: Establishing and managing mid & long-term export plans	-0.72 [c]	-0.13	-0.17
s65: Training export personnel	0.23	-0.34	-0.37
Constant term	1.46	-0.11	-1.55 [b]
Observed value	138	138	138

Note: For standard errors, the robust standard errors are used while a, b, c respectively means the significance level of 1%, 5%, and 10%.

Source: Author generated.

It was found that the field survey for market penetration strategy had positive effects on expanding the number of export destination countries, but had negative effects on export value per capita and export intensity. As a result of actual interviews with companies, the direct field survey was found to be efficient for diversification. Though they put more emphasis on establishing ongoing, trusting relationships with buyers and contract management for previous markets after a certain period of adapting export.

It was also found that the monitoring and post management strategy had positive effects on export performance, and this strategy can be a very useful strategy for the short-term. Unlike results from previous field surveys, this is because it can cope with fast changing trends by obtaining information on the items and market conditions with relatively low costs. It was found from the interview surveys that monitoring export market information is useful to nimbly and dexterously deal with sudden changes in consumers' preferences when selecting export items.

It was determined that R&D investments for the medium-size exporters for processed agri-food (Type B2) had positive effects on export value per capita and market diversification. This is different from the small-scale processed agri-food exporters (Type B1). It can be inferred that the medium-size companies' investments in development of new items or customized production can be stepping stones for quickly expanding the number of countries based on the economies of scale.

3.4. Consigned production exporters for processed agri-food (Type C)

The Type C companies are companies exporting processed food by consigned production. In the case that the entire or a part of export products are consigned produced, the one that procures products and then professionally exports them, is included. According to the classification, the Type C companies include many export specialized companies and mid-size food companies. This group is comprised of companies with quite a number of employees and relatively large-scale turnover in general. The Type C companies' major export items are other processed food, ginseng, tea, and so forth.

<Table 4-23> strategy factors for consigned production exporters for processed agri-food(Type C) by performance index

Consigned production and processed agri-food exporters(Type C)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
ln(Experience in export)	0.26	0.46 [a]	0.55 [a]
ln(# of employees)	-0.62 [a]	-0.11 [b]	0.10 [c]
# of participation for export support programs	0.03	0.02	0.06 [b]
s1: Enhancing competitiveness of production cost	-0.03	0.04	-0.13
s3: Pursuing product functionality	-0.29	0.64 [a]	-0.32
s6: Custom made production or make-to-order	-0.58	0.22	0.05
s7: Focusing on main export product(item)	-0.33	-0.02	0.73 [a]
s10: Targeting niche markets	0.42	0.15	0.24
s13: Targeting overseas Koreans	-0.86 [a]	-0.15	-0.55 [a]
s15: Overseas market diversification is important	0.26	-0.27	0.39 [c]
s28: Operating brand management dept.	1.54 [a]	-0.13	0.70 [a]
s29: Establishing system for product quality management	-1.51 [a]	-0.14	-0.23
s33: Monitoring post management of export market	0.52	-0.05	-0.92 [a]
s34: Acquiring certifications	-0.09	-0.45 [c]	0.65 [c]
s35: Establishing system for dealing with food safety and sanitary inspection	-0.85 [b]	-0.90 [a]	-0.12

(Continued)

Consigned production and processed agri-food exporters(Type C)	(1)	(2)	(3)
	export value per capita	export intensity	market diversification
	Estimated coefficient	Estimated coefficient	Estimated coefficient
s36: Labeling product info in local language	0.81 [b]	0.14	0.79 [a]
s38: Utilizing joint/alliance/nation's brands	-0.37	0.08	-0.53
s39: Conducting field surveys when entering into new overseas markets	0.02	-0.28	0.27
s40: Securing local buyers by export consultation via exhibitions	-1.33 [a]	0.48 [b]	0.34
s43: Conducting own local market advertisement and PR	-0.03	0.52 [b]	0.82 [a]
s47: Liaising/collaborating with local distributors	0.85 [a]	0.39 [b]	0.15
s49: Utilizing air transport	-0.42	0.32	0.03
s50: Establishing cold-chain system for export logistics	0.76	0.13	-0.11
s53: Securing stable export volume	0.61	0.11	-0.14
s54: export insurance	0.27	0.48 [b]	-0.05
s56: FX risk management	-0.87 [b]	0.06	-0.01
s57: R&D investments	-0.78	-0.35 [c]	0.41 [b]
s62: Establishing and managing mid & long-term export plans	-0.54	-0.23	-0.33 [b]
s65: Training export personnel	0.77 [c]	-0.39 [b]	-0.27
Constant term	6.43 [a]	-1.36 [a]	-2.09 [a]
Observed value	109	109	109

Note: The standard errors used the robust standard errors, and each a, b, c means the significance level of 1%, 5%, and 10% respectively.

Source: Author generated.

It was found that the strategy for penetrating niche markets or targeting overseas Koreans was not statistically significant for improving export performance for consigned production exporters for processed agri-food (Type C). Therefore, promoting export strategy by securing large-scale markets and consumers rather than targeting a particular market would be much more positive for improving export performance for the Type C companies.

It was found that operating an image and brand management department was efficient for expanding export value per capita and the number of export destination countries. The companies operating a dedicated department are relatively larger in scale than the companies without operating a dedi-

cated department.[41] Additionally, they are expected to have high utilization of brand and corporate image and a specialized organizational system. Therefore, it would be feasible to efficiently develop brand/images for product PR, promote design business, and systematically manage them. Therefore, the strategy of operating a dedicated brand management department did have positive effects on export performance.

It was also determined that own local PR was efficient for expanding export intensity and the number of export destination countries. Plus, the local distribution/collaboration strategy was also efficient for export value per capita and export intensity. The account management through promoting product directly and direct transaction would be more efficient for the consigned production exporters for processed agri-food (Type C) rather than co-marketing or relying on the buyers. During the interview with the companies, it was observed that while local distribution liaison/collaboration strategy may have the burden of direct management, it was perceived to be efficient when the export volume was big.

It was also shown that the strategy of training export personnel had positive a (+) relationship with export value per capita and a negative (-) relationship with export intensity. Training export personnel can be executed by various manners such as employment of export personnel or expertise enhancing training. Type C companies had a higher portion of training export personnel compared to other types.[42] It is an encouraging result that the training export personnel strategy is efficient for increasing export value per capita. The enhancing human capacity strategy is normally conducted from a long-term perspective. Nonetheless it was found that this strategy could be efficient for increasing export value as a result of analyzing the Type C (consigned production exporters for processed agri-food). The reason it had negative relations with export intensity is that the export intensity vari-

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[41] As a result of survey, the ratio of companies operating a relevant dept. is relatively low at approximately 17% from the type C companies, but their number of employees is 5 times bigger than the companies not operating a relevant dept. implying that it is a strategy taken by big companies. (74 vs 369).

[42] The ratio of selecting the relevant strategy for A, B1, B2, and C in order is 29%, 33%, 40%, and 47% respectively.

able is calculated as the export value on turnover.

4. Policy implications

A. Fresh agricultural product exporters (Type A)

Fresh agricultural product export is under the assumption of quarantine settlement between countries. Therefore, it seems that some strategies are not effective for improving fresh agricultural product exports due to the characteristic that the number of countries that the companies can export to are limited. However, emphasis on a product's functionality, conforming to labeling in local languages, local distribution collaboration, and export risk management would all be efficient in improving export value and export intensity. In addition, the fresh agricultural product exporters with an expanding plan for the number of export destination countries need to actively secure the various markets. Especially, since the companies utilizing the strategy for active market research and securing buyers have notably expanded the number of export destination countries.

A high proportion of fresh agricultural products exporters (Type A) focus on their existing markets rather than considering entering new markets. A high number of Type A exporters, compared to then average number of responses, answered the survey listing the difficulties of new market penetration such as organizing local marketing, export logistics, and price competitiveness. The global competitiveness in quality is highly evaluated, but a high portion of the companies set the sales price considering the competitors' price. It implies that it is reflected in the reality that competitiveness in the local market is determined mainly by price, as the domestic market prices are relatively constant. The satisfaction level on the export performance is high compared to the entire average in terms of the rate of return, market share, and growth rate. In light of the foregoing, the companies exporting fresh produce would have better market penetration if the

burden for local marketing and logistics would be lessened.

For the fresh agricultural products exporters (Type A), participation in support programs on topics such as export logistics cost, export insurance, overseas promotion events, utilization of KATI information, and utilization of FTA preferential tariff is high compared to the entire average. Conversely, participation in support programs on topics regarding the local government, international exhibitions, buyer invitation conferences, registration of overseas certification, KOTRA, and SBA is relatively low. Therefore, the policies to promote participation in the support programs such as overseas standard certification or export risk management would be helpful for improving export performance. In addition, reinforcing the support policies would improve the efficacy of export support since participation in events regarding the previous export insurance and overseas promotion experiences is relatively high. Additional policies calculated to lessen the burden of local marketing along with the reinforcing the support policies need to be designed. Also, since price competitiveness would have a higher chance to be decreased in the short-term if the export logistics cost support, which is a highly participated in program, is stopped in the future. Nonetheless, as shown in the results, the companies with a high ratio of export support have a higher chance of being stopped from the perspective of export sustainability. Therefore, the support policies for company's voluntary improvement of competitiveness would be effective for continued stable export and new market penetration in the long run.

B. Processed agri-food exporters (The type B1 and type B2)

The type B1 and type B2 exporters were classified by the scale of employment among all the directly producing and processing exporters, whereas the gap in the average scale of the two groups was reflected by the company's export experience such as the number of years for being in business and the company's investment potential from the perspective of turnover. There were many commonly utilized strategies, but the strategies most efficiently utilized varied depending upon the company's scale. For small scale processed agri-food exporters (Type B1), establishing export strategies,

which focus on export stability by export volume and risk management, and focus on the current major export markets targeting potential market such as niche markets, would be efficient for improving export performance in the short term. For the medium-size exporters of processed agri-food (Type B2), the strategies for pursuing big scale consumer markets (rather than niche markets), market diversification, and R&D investment would be most efficient for improving export performance.

It is a particular characteristic that the analysis results are different when the number of export countries is used as an export performance index. Compared to the B2 companies (medium-size processed agri-food export), the relationship between the strategies and the number of export destination countries for the Type B1 companies (small scale processed agri-food export) was not statistically significant. In other words, it is expected that promoting strategically at the higher level of a certain scale would have meaningful performance improvement if a company pursued this after expanding the number of export destination countries.

The type B1 and type B2 companies responded that the lack of market information and non-tariff barriers mattered more in terms of the difficulties of new market penetration compared to the entire average. The costs of initial investments or securing funds for export were a relatively big burden for the Type B1. The type B1 and type B2 companies answered that setting export prices were based on the production cost and the proper margin, while the local price level or requirement level had relatively less effect on setting prices. The quality and technological global competitiveness of B1 companies were evaluated as relatively low compared to the entire average, but were higher than that of B2 companies. It was also analyzed that the rate of return was generally high for the B1 and B2 companies, even though their market share was relatively low. Therefore, it was important for the type B1 and type B2 companies to expand their opportunities regarding active utilization of the market and non-tariff measures when penetrating new markets. Also, if the initial investment costs were supported in advance for the type B1 companies, it would be helpful for penetrating new markets. This would also be effective for expanding export to focus on the support policy for market share and growth rate rather than the rate of return on export.

The small scale processed agri-food exporters (Type B1) participation in the export support programs regarding local government, international exhibitions, and overseas certification registration was higher than the average. On the other hand, the level of participation in most of the export support programs for the medium-size exporters for processed agri-food (Type B2) was above average, but participation in programs designed to help participation in international exhibitions was slightly lower than B1 companies. It seems that the Type B2 companies expanded their export by economies of scale, quality, and technological competitiveness to penetrate large-scale markets. Therefore, constant support by reinforcing the existing policies for the type B2 companies would be helpful for stable export for the entire agri-food industry. This would also be effective for expanding export by giving the support to improve quality and technological competitiveness targeting niche markets with small scale for Type B1 companies.

C. Consigned production exporters for processed agri-food (Type C)

The consigned production exporters for processed agri-food (Type C) are companies who are able to specialize in concentrating on marketing and export, compared to other company types in our study. A quantitative analysis result, of our study showed that operating a brand management dept., having own local PR, having a local distribution liaison/collaboration strategy, and training export personnel had positive effects on the export performance. Being able to observe the efficacy of other strategies can be a different point especially where it was difficult to promote image dedicated dept. and training export personnel due to their costs, and did not show any statistical significance.

The Type C companies answered that finding new buyers was the most difficult when penetrating new markets. Their second most frequent answer was that they do not consider penetrating new markets due to non-tariff barriers. The share for setting overseas market price by considering the local market was the biggest, which is then followed by global competitiveness in quality, production cost, and technology in that order. However, it

was found that export performance or satisfaction level on rate of return, market share, and growth rate were relatively low compared to the entire average. Therefore, it seems that while export competitiveness was high for the Type C companies, they were not active in penetrating new markets due to external factors such as non-tariff barriers.

The level of participation in the export support programs excluding KOTRA, SBA, and joint air logistics for the consigned production exporters for processed agri-food (Type C) was lower than the entire average. This may be because the Type C group was composed of companies who export not only agri-food but also various items focusing on marketing and local distribution. Therefore, it is necessary to create policies that seek for ways to address unnecessary entry barriers, and provide information on external environments such as non-tariff measures in order to increase the level of concentration on agri-food trade by the type C companies and boost their competitiveness for the expansion of agri-food export.

Chapter 5. SUMMARY AND IMPLICATIONS

□ Background of Research

As a result of the proliferation of FTAs (Free Trade Agreements), both imports and exports of agri-food have been expanding daily. Thus the importance of policies for impacting agri-food exports has increased in terms of their effect on companies entering and applying the global value chain, associating agriculture and the food industry, developing new markets, and creating jobs. It is therefore important to develop systematic export strategies in the farming industry. However, there have been few theoretical and empirical studies on the role of agri-food exporters as the core of the new trade theory. Therefore, one of the main purposes of this study is to analyze the determinants of exports and the factors influencing export performance for agri-food exporters. Based on the results of this analysis, we identified the key strategic determinants as per export performance and effective strategies for each type of agri-food firm, and then deduced policy implications to improve export-supporting programs. This study as an empirical study does have differentiated points that analyzed the impacts of various characteristics, strategies, and in/out changes in the surroundings of agri-food firms on decision making and export performance.

□ Method of Research

For our analysis, we used literature review, statistical analysis, econometric analysis, surveys, interviews and expert consultation. Based on a review of prior studies on the determinants of export and export performance, this study examined both the theoretical and empirical backgrounds and the

status of agri-food exports by analyzing the current status of agri-food firms. Statistical data were collected from various sources and used for the analysis. We further examined the effects of corporate characteristics and changes in the external environment on export decisions and export performance utilizing Statistics Korea MDIS Business Activities, aT's performance data for export supporting project, and so forth. We also used the results of our survey on the agri-food firms to analyze the relationship between export strategies and export performance of agri-food firms by type. Furthermore, in order to qualitatively complement the analysis, surveys along with empirical analysis results, expert consultation and interviews were conducted. The research model and the survey questionnaires were reviewed by experts and reflected in the study. We also conducted interviews mainly with high performance firms to complement the results of the empirical analysis results.

□ Agri-food exporters' current status and characteristics

The export value for Korean agri-food has been increasing daily. Export destination countries have increased and diversified. In terms of export destinations, the number of countries increased by about 14% compared to 2008, while the share of beverage and other confected agricultural products has increased a great deal also. The number of exporters in F&B (food, beverages) manufacturing was approximately 1,500 and has increased by about 29%, and increased 11% in export value as compared to 2010. 94.1% of the F&B and cigarette manufacturing exporters are SMEs accounting for 25% of the relevant industry's export value. The share of SMEs' export value is relatively high compared to general manufacturing but the export value per company is fairly low. The share of export value for the F&B and cigarette manufacturers with low intensity of export was higher than the general manufacturing average. Whereas the share of export value for the companies with high intensity was lower than the general manufacturing average. By expanding the export of F&B and cigarette manufacturing to the USA, EU, and S.E. Asia, the industry's dependency on export to Japan has decreased compared to 2010. The number of export countries and export items has been continuously expanding, while the major export items

vary depending on the countries. The top export items to Japan have consistently been Kimchi, paprika, and lily. While the top export items to China have changed from red ginseng to citrus tea, and other dairy products. The major export items to Taiwan were red ginseng, pears, and so forth.. While pears, winters mushrooms, and so forth were the major export items to the USA, for Vietnam, the main exports were frozen chickens, powdered milk, and so forth. While strawberry, red ginseng, citrus tea, and etc. were the main exports to Hong Kong .

The number of export destination countries for Korean agri-food has consistently expanded over the past 10 years. Japan, China, and the USA have been the major export destination countries. However, it was found that the export market has diversified by expanding to the Middle East (UAE, and etc.) and S.E. Asian markets (Vietnam, and etc.), which have decreased export dependency on the Japanese market. The major export items have not changed much in terms of their share order but they may have varied depending upon the export destination country. Risk diversification by diversification of export items is important considering the fact that a strategy targeting a certain item has advantages for putting all competencies in one spot. However, there are still difficulties in dealing with the ever changing environments in the export destination countries. Therefore, it is necessary to seek export diversification strategies to expand the types of items along with the market diversification strategies to expand export destination countries and thus creating more stable export expansion.

□ Export activity factors for agri-food firms: Entry to and continuing export

The agri-food industry and the manufacturing industry excluding agri-food were analyzed by utilizing Statistics Korea' micro panel data from the business activities survey for 2006~2016. The total factor productivity and labor productivity were considered for productivity, while it was found that the productivity of exporters was generally higher than for domestic companies when verifying the gap of distribution. However, the difference in the rate of increase for productivity between exporters and domestic companies were not typically significant.

Based on the analysis by industry, it was found that whether to export (export's sunk cost) and productivity (total factor productivity) in the previous year had positive effects on both decision making for export of agri-food and manufacturers. This is similar to the results from the previous empirical analysis, in which the company's characteristics such as scale (# of employees) and experience (# of years for biz) have positive efficacy on export decision-making. The externality's effects vary depending upon industry, but it was shown that the externality's positive direct efficacy (infra, logistics, knowhow) was more meaningful than the competition efficacy <Table 5-1>. This result confirms the self-selection theory, in which the company's export decision-making was made per the productivity and fixed costs of the new trade theory. As a result of testing the learning by exporting theory it was identified that the learning by exporting theory was not statistically significant in Korea's manufacturing and food industry.

Next, the corporate characteristics between industries that have effects on export sustainability were examined. Examining the survival function estimation result, it was found that food companies in the middle scale (100~300) had a higher rate of sustainability than the companies under other scales, while food companies under the 'over 300' scale had a tendency to dramatically decrease in the sustaining rate after the start of export. Conversely, companies with 300 employees or more have the highest sustaining rate among the manufacturing (excl. food) companies.

We evaluated the effects of a company's characteristics on export sustainability by using the Cox proportional hazard model. We found that # of years for being in business and in same industry within the region portion for food companies, and the # of years for biz, # of employees, productivity, and same industry outside the region, and same industry within the region portion for manufacturers all lower the risk possibility of leaving the export market <Table 5-1>. In other words, it is inferred that the companies with the longer history would have lower risk of export being stopped. Whereas positive externalities such as an increase in the portion of the same industry within the region, an increase in export infrastructure in the region, and new information have positive effects on export continuation. However, we found that factors such as scale, productivity, and the presence of a similar industry outside of the area for the food com-

panies did not have significant effects in decreasing the possibility of export being stopped.

<Table 5-1> Agri-food firms' export entry and continuing

	industry	total factor productivity	Labor productivity	whether to export in the previous year	Company's years of business	Scale	same industry outside of region	different industry in the region	same industry in the region
whether to export	Food	O	O	O	O				
	Manufacturing (Excl. food)	O	O	O	O	O	O	O	
export sustainability	Food				O				O
	Manufacturing (Excl. food)	O	O		O	O	O		O

Note: O implies when an increase in the relevant variable did have positive effects on whether to export or an export's sustainability.
Source: Author generated.

It is an important task to create an industry's ecosystem where many agri-food firms can function with distinctiveness rather than through routine extensions of export. This is important for expanding the export of agri-food firms in the long-term since the productivity of a company is a variable representing a company's competency and ingenuity in producing differentiated products. Likewise, the policy support focusing on vitalization of entering export markets by highly productive companies is necessary for improving the productivity of the agri-food industry on the whole.

□ Export activities factors for agri-food firms: export routes sustainability

The companies-item and companies-countries unit's export sustainability was analyzed by utilizing the aT's export support performance data for the years 2005~2017. It was found that 25% of the new agri-food export routes in Korea had a sustaining period of less than a year, and 50% would be stopped at the 5th year. However, the companies with sustaining export routes are the ones leading the stable agri-food export. The study area fo-

cused on ① China, ② Japan, ③ SE. Asia, ④ the US, ⑤ EU, and ⑥ others. It was found that the Japan market had the highest export sustainability whereas the SE. Asia market had the lowest export sustainability. As a result of our analysis, Kimchi was observed to have the highest export sustainability while fruits, grains, processed rice, and other processed products showed relatively short years of continuing export.

<Table 5-2> Factors having effects on export routes sustainability

		processed or not	import country GDP	FX rate changes in import country	item diversification	market diversification	# of Koran companies in export routes	relative export price ratio	Ratio of export subsidized	1st year's export value
Entire agri-food		O	O		X	O	O	X	X	O
By region	China		O	O		O			X	O
	Japan		O				O		X	O
	SE. Asia	O			X	O		X		O
	the US		X	X		O	X	X		O
	EU				X	O				O
	others		O	O		O	O			O
By item	tea			O		O	O			O
	ginseng	O		O	X	O	O	X		O
	fruits				X	O		X	X	O
	vegetables		O	O		O	O			O
	flowers		O				O		X	O
	Kimchi						O			O
	livestock products	O			X	O	O	O	O	O
	traditional liquor		O		X	O	O	X	X	O

Note: O implies the positive effects on export routes to be continued by increase of the relevant variable, whereas X means the negative effects on export routes to be continued by increase of the relevant variable.

Source: Author generated.

Next, our analysis of the factors influencing the continuity of export routes showed that the probability of discontinuing the export routes is increased by product diversification whereas the probability of continuing the

export routes is increased by market diversification.

Our study also established that the existence of similar export routes work as direct effects increasing the probability of continuing the export. Conversely, we observed that the higher the relative export price and the export subsidy rate, the higher the probability of discontinuing the export. (<Table 5-2> Entirety).

As a result of our analysis by region, it was shown that the possibility of export sustainability increases as the FX rate (CNY on KRW) is increased in China. The existence of similar export routes in the US actually increased the probability of export to be stopped, but the possibility of export sustainability increased as the export support rate increased. As a result of the analysis by item, it was found that item diversification for vegetables has positive effects on export sustainability. Our study also showed that the possibility of export sustainability increases as the relative export price for livestock products increases. (<Table 5-2> by area and item).

□ Export strategy analysis for agri-food exporters

Utilizing our survey data, we investigated the relationship between export strategy and export performance (export per capita, export intensity, market diversification, export growth rate and years of continuing export), as well as what makes effective export strategies. (<Table 5-3>Refer to the row E, P, and D of Entirety). In the results of the analysis of the entire company samples, we observed that the relationship between strategy and performance differed depending on what is considered as the performance indicator while some strategies could have a negative effect on export performance. The strategies focused on management of export risks and increase of market awareness of product would generally be efficient for improving performance if export value per capita and export intensity are used as the performance indexes. Specifically, the risk management strategies for export value loss have statistically significant positive (+) relations with the export value increase whereas the strategies regarding logistics or distribution have statistically significant relations with the improvement of export intensity.

The strategies with the burden of high costs including investment strategies and building facilities or systems over the long-term perspective, and

targeting specific consumers such as overseas Koreans were found to have negative (-) effects on export value and export intensity in the short-term. Therefore, it is advised to focus and pay more attention when selecting a strategy. However, it was also found that the strategies (focusing on major products, operating dedicated brand management dept. and field survey, and R&D investments) that did not have significant effects or negative (-) effects on the export value or export intensity had positive (+) relations with the expanding the number of export countries.

In order to meticulously and minutely analyze the factors and strategies having effects on the company's export performance, the export support performance data and survey results were integrated. The observed values are defined as 'continuing export routes by region' and 'continuing export routes by item'. This was based on the business unit export performance from the export support performance data where each of the observed values would have variables such as the years of continuing export, unit cost for export, and ratio of export support. The companies listed in the export support performance data coincide with the 159 of the companies that answered the surveys. The survey responses from these companies were collected and aggregated into the data. Sorting the data by region and by item established two data sets, which were then analyzed.

Bearing in mind that the coefficients on the results of two estimates and each strategy factors appeared statistically significant, the strategies that have positive effects on export increase are: ① focus on major export products, ② export after product purchase, ③ Utilization of FTA preferential tariff, and ④ stable securing export volume. The factors that had negative effects on export increase are: ① enhancing production cost competitiveness, ② custom made production(make-to-order), ③ procuring raw materials from the market or contract farming, and ④ operating dedicated department for brand or design. In addition, there was no strategy that has conflicted effects on export increase by item and area. (<Table 5-3> Refer to G row of Entirety).

We estimated how a company's export strategies have effects on export sustainability using the Heckman's step2 model, and found that the factors that have positive effects on export sustainability by region and item are: ① targeting overseas Koreans, ② export consigned to export agency, ③

obtaining certifications (GAP, HACCP, ISO, organic farming, environment friendly), ④ exposition or exhibitions utilized consultation and securing buyers, and ⑤ establishing and managing mid & long-term export plan. However, the factors having negative effects on export sustainability are: ① establishing quality management system for product standardization and uniformity, ② utilizing air transport, and ③ R&D investments. There were no strategy factors that have statistically conflicted effects on export sustainability. (<Table 5-3> Refer to G row of Entirety)

<Table 5-3> Company's characteristics, export strategy, and export performance

Type	All					Type A			Type B1			Type B2			Type C		
export performance / characteristics, export strategy	E	P	D	G	S	E	P	D	E	P	D	E	P	D	E	P	D
Experience in export	O	O	O			O	O	O		O	O	O	O	O		O	O
Scale			O					O						O			
Drive for export	O		O			O			O	O							O
s01: Enhancing production cost competitiveness											O						
s03: Pursuing functionality	O				O	O	O										
s06: custom made, make-to-order			O										O	O			
s07: Focusing on main items			O	O				O									
s10: Focusing on niche markets									O	O							
s13: Targeting overseas Koreans					O												
s15: Market diversification is important											O	O					O
s28: Brand management dept.			O					O							O		O
s33: monitoring, post management		O								O		O	O				
s34: Acquiring certifications					O												O
s36: Labeling in local languages			O			O				O			O		O		O
s38: Utilizing co-brands	O	O				O											

(continue)

Type	All					Type A			Type B1			Type B2			Type C		
export performance / characteristics, export strategy	E	P	D	G	S	E	P	D	E	P	D	E	P	D	E	P	D
s39: field survey for market penetration								O						O			
s40: Securing buyers via exhibitions					O			O								O	
s43: Own local PR				O										O		O	O
s47: Liaising/collaborating with local distributors		O					O						O	O	O	O	
s49: Utilizing air transport								O									
s53: Stable export volume	O			O	O				O	O							
s54: export insurance	O	O		O			O										
s56: FX risk management	O						O		O	O				O			
s57: R&D investments			O						O			O		O			
s62: Mid & long-term export plan management					O	O			O								
s65: Training export personnel															O		

Note: O implies that relationship between the relevant explanatory variables and dependent variables is positive (+) relation. Each export performance E, P, D, G, and S represents export value per capita, export intensity, market diversification(number of export countries), export growth rate, and years of continuing export.

Source: Author generated.

□ Export strategy of agri-food firms by type

What are effective export strategy for agri-food exporters by type was analyzed for ① fresh exporters (Type A), ② small scale processed agri-food exporters (Type B1), ③ medium-size exporters for processed agri-food (Type B2), ④ consigned production exporters for 4 types of processed agri-food (Type C). Effective strategies for the companies export performance by type was quantitatively analyzed. The export performance was examined by export value per capita, export intensity, and number of export countries similar to the entire companies analysis (refer to the results of analysis of companies by type <Table 5-3>). In addition, the results of the surveys and

investigation on the company practices complemented the results of quantitative analysis.

The fresh exporters (Type A) include NH, agriculture incorporated companies, agricultural association corporations, dedicated horticultural production complex, and fresh agricultural products from specialized trading companies. Since fresh agricultural products export is under the assumption of quarantine settlement between the countries, it seems that some strategies are not effective for improving fresh agricultural products export due to the characteristics that the countries which the companies can export to are limited. However, emphasis on a product's functionality, conforming to labeling in local languages, local distribution collaboration, and export risk management were found to be efficient for improving export value and export intensity. As a result of analyzing the aspect of the number of export destination countries, the strategy for securing buyers and company's own PR was found to be is needed since the exportable countries (markets) are limited. Therefore, it likely to be effective for utilizing strategies such as active market research and securing buyers, and utilizing own brand together with co-brands.

The small-scale processed agri-food exporters (Type B1) are composed of the companies with the less than 10 employees and who export directly produced products. Their major export items include other processed products, ginseng, processed rice, tea, and so forth. In studying small exporters of processed agricultural products, it was found that focusing on the current export markets together with the potential markets, such as niche markets, and pursuing export stability through export volume and risk management were effective in improving export performance (export volume per capita, and export intensity).

However, the statistically significant strategy of expanding the number of export destination countries for the Type B1 companies export strategy is smaller than the Type B2 companies (Medium-size processed), which is bigger in scale. It is because export strategy for small-size companies is more effective than market diversification for improving the total revenue or the intensity level of export such as export value or the concentration level of export. When a company pursues market diversification, it should be carefully and distinctly considered, since the companies would have lim-

itation on expanding the number of export destination countries by only very strategic activities as seen in the result of our analysis.

Medium-size exporters for processed agri-food (Type B2) have 11 or more employees exporting directly processing food similar to the Type B1 companies. Their major export items include other processed food, Kimchi, and ginseng. Pursuing large scale consumer markets, export market monitoring, post export management, collaboration with local distributors, and R&D investment have positive effects on improving export performance, rather than using custom made product production, and trying to find niche markets. However, the big scale companies' export competencies and goals by company should be considered since there are many ways to promote various utilizations of strategy execution.

In the case of consigned production exporters for processed agri-food (Type C), the companies that export products based on partial or entirely consigned production, and purchase products and professionally export are included. According to the above classification, the specialized trading companies and mid-size food companies are included in the Type C. It is mainly composed of the companies with the large number of employees or turnover in a large scale. It seems that these companies fare better by focusing on improving export performance rather than targeting the Korean -American markets or niche markets. In addition, it was analyzed that operating a brand management dept., having own local PR, a local distribution liaison/collaboration strategy, training export, and have personnel strategies have significant effects on improving export performance. It was a common characteristic that the efficacy of strategies was observed if the company is scaling-up efforts such as training export personnel and running image-branding operations.

□ Policy directions for agri-food firms by type

In the case of exporting fresh agricultural products (type A), it was found that emphasizing the function of the product, labeling in local languages, cooperating with local distributors and managing export risk have all improved the export value and export intensity. It was shown that the possibility of expanding the pertinent market for the firms in type A could be

increased if they meet the quarantine requirements as well as the conditions of local marketing and logistics. In addition, since export insurance and overseas promotions supporting programs are highly participative, the efficiency of export support can be improved by reinforcing policy instruments.

The type B1 and type B2 companies are classified by the scale of employment. For the small scale processed agri-food exporters (Type B1), establishing the export strategies, which focus on export stability by export volume and risk management, and focusing on the current major export markets targeting potential market such as niche markets, would be efficient for improving export performance in the short term. For the medium-size exporters of processed agri-food (Type B2), the strategies for pursuing big scale consumer markets (rather than niche markets), market diversification, and R&D investment would be efficient for improving export performance. Providing information on the new markets and their non-tariff barriers would enable B1 and B2 firms to advance to these markets, while the firms in the type B1 can make inroads into new markets if the initial investments support is preceded. It would be effective for expanding export by giving support to improve quality and technological competitiveness targeting niche markets on small scale for Type B1. While consistent support by reinforcing the previously in place policies for the type B2 companies would be helpful for their stable export and for of the entire agri-food industry.

The consigned production exporters for processed agri-food (Type C) are the companies, who are able to specialize in concentrating on marketing and export, compared to other types. Specifically it seems that the results showed that such factors as having an image-dedicated dept. and training export personnel image were shown to be significant for the type C, however they cannot be executed easily due to their costs and employee expenses.

Since the firms in type C have competitive strength in export but have had difficulties in outer factors such as non-tariff barriers to penetrate new markets, efforts to lower non-tariff barriers in trade negotiations would enable Type-C firms to expand their export market. In order to expand the overall export of the agri-food industry, it is necessary to develop policies to increase the export intensity of competitive exporters such as Type-C firms. Therefore, in addition to the policy support for productivity improve-

ment of the agri-food firms in general, we advise improving provisions of overseas market information, and expand the support programs for joint marketing and logistics infrastructure in export markets for their better utilization by the firms.