

Korea's Countermeasures and their Implications for International Environmental Regulations*

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Abstract

Recently, environmental regulations around the world have been strengthened focusing on advanced countries. In this respect, there is a growing proportion of the role of government to respond properly in the environmental regulations. This study aims at analyzing countermeasures of environmental regulations of Korea government and presenting the implications. This research results show that the environmental support system of Korean government has the following problems: 1) Inadequacy in the law system related to environmental regulation, 2) Absence of validity evaluation systems of support policy for international environmental regulations, 3) Expansion of the gap in the ability to cope with environmental regulation by company size. For the countermeasures for these issues, we presented the following solutions: 1) Step-by-step, gradual reinforcement in environmental standards to fit the international regulations, 2) Arrangement of monitoring system regarding environmental regulation, 3) Support in acquiring ISO certification, 4) Establishment of joint reaction system regarding environmental regulations.

Keywords: International Environmental Regulation, TBT, Korea-REACH, COMPASS

JEL classification codes: F1, L5

1. Introduction

Recently, as FTAs have been spread throughout the world, some of trade barrier, tariff and quantitative trade restriction (quota), are cutback or abolished. Meanwhile, non-tariff barrier, such as standard, certification, technology regulation related to environment, have a tendency of being strengthened. Especially, increasing concerns over climate change and environment protection, technology regulation to improve energy efficiency and environment protection are strengthened. With EU's introduction of REACH, REACH act has been spread throughout the Asian countries like Taiwan, Japan, Korea, and the number of nations introducing GHS related to the classification and labeling of chemical substances are increasing.

Environment regulations recently tend to move on to TBT (Technical Barriers to Trade) so that individual countries can protect their own domestic industries by strengthening their environment regulation, instead of Multilateral Environmental Agreements, which makes it difficult for a mutual agreement. The number of TBT notified to WTO was 1,564 in 2014, and among these, the number of technology regulation (product standard, certification) that is aimed for the energy reduction or environment protection was 88 in 2004 and is doubled to 248 in 2014¹.

Also, the majority of product related international environment regulation has been centered in electric/electronic, vehicle, chemical industry (which are all Korea's main export industry), and countries with international environment regulation are Korea's main export countries. In other words, Korea's main export industries, electric/electronic, vehicle, chemical industry

which counts 56% of Korea's overall export, are exposed to the risk of international environment regulation. Therefore, when considering the economic structure of Korea, where export plays tremendous role, we ought to keep an eye on the reinforcing movement of the international environment regulation and to react to it appropriately.

Meanwhile, companies are continuing their self-supporting efforts to cope with international environment regulation. One example of them is the case of large company. They have specialized departments in charge of international environment regulation, so that they can actively cope with environment regulations such as RoHS or REACH. However, in the case of small and medium-sized companies, they lack professional manpower or feel the burden of expenses limitations, and poor understanding of international environment regulation, which makes it difficult for them to cope with international environment regulation. According to the results of 'Research on the actual condition of reaction to the international environment regulation' conducted by Korea Federation of Small and Medium Business in March 2014, approximately 23.5% of the small and medium-sized businesses are reported to have difficulty in coping with international environment regulation. Especially, in small and medium-sized businesses, the reasons of their difficulty are reported to be lack of information and professional manpower related to international environmental regulation (49.9%), burden of expenses of environment regulation, such as trial and certification (31%). Therefore, government's institutional support is required urgently. Consequently, since the international environment regulation is being reinforced these days, in this paper, Korea's reaction support situation for the international environment regulation are reviewed and effective improvement plans are examined.

The composition of this paper are as follows: firstly, in chapter 2, preceding research related to international environment regulation will be reviewed. In the third chapter, the concept of international environment regulation will be briefly summarized, and recent trends regarding the international environment regulation will be looked at. In chapter 4, we will look at Korea's current support situation and their tasks regarding the issue of international environment regulation. Lastly, in the fifth chapter, a brief summarization of this paper is presented.

2. Overview of Preceding Research

Some of the representative domestic studies regarding international environment regulation are as follows: Bong Jin Jung and Kwi Ho Lee (2010), Hyeok Ki Min (2010), Kwon Woo Doh and Hwan Il Park (2010), Jong Sub Lim and Jun Hyeong Lim (2011), Kwang Woon Yun and Seong Ho Kim (2013), Sang Goo Kang and Yong Keun Lee (2013).

First of all, Bong Jin Jung and Kwi Ho Lee (2010) sought ways to enhance companies' competitiveness and to expand of new markets through an analysis of companies' reaction to international environment regulation. According to the research results, the latest information about international environment regulation and technology development should be synthetically provided and this information should be standardized for a better establishment of international environmental standards.

Hyeok Ki Min (2010) stated that international environment regulation increases individual companies' production costs. In cases of violating this regulation, they may be excluded from the market, on the other hand, their coping methods for the regulation can be motives for growth to

individual companies' or countries.

Since the global financial crisis in September 2008, the global economy has been under a period of rapid economic stagnation. In the meantime, since the regulation on environmental industry which is becoming a momentum for growth, is being reinforced. Kwon Woo Doh and Hwan Il Park (2010) is concerned that international environment regulation may become an invisible trade barrier. Especially, in case conflicts occur because of the environmentalism, since resolving the problem through WTO takes a long time, we need to focus on developing new environment technology and also try to establish our technology into a global standard and foster the domestic environmental industry.

Jong Sub Lim and Jun Hyeong Lim (2011) analyzed the effects of regulation aimed to protect the environment on their companies and proposed some countermeasures. To be more specific, companies can develop eco-friendly products, obey environmental legislation, and practice eco-friendly management.

Kwang Woon Yun and Seong Ho Kim (2013) analyzed the effect of international environment regulation on export companies' GSCM (Green Supply Chain Management) results. According to the results, in cases where companies are greatly affected by RoHS (Restriction of Hazardous Substances), they tend to choose the GSCM method in order to cope with RoHS guidelines. And the higher they choose the GSCM method, the more positive performances they obtain.

Sang Goo Kang and Yong Keun Lee (2013) emphasized that many countries are making their own environment regulations that reflect their own characteristics, because international environmental treaty negotiation cannot appropriately take place because of an acute interest between advanced countries and developing countries. Especially, in case of Korea, which highly relying on export, the reinforcement of international environment regulation may lead to a decrease in export. They suggested countermeasures such as establishment of coping foundation for international environment regulation, securement of professional manpower, installation of exclusive institution for environment.

Above preceding researches focus on explaining companies' countermeasures for the reinforcement of international environment regulation or the effect that regulation has on countries' domestic export. However, as conservative environment regulation is reinforced which protects domestic countries' profit, it is becoming more difficult for a company to independently cope with it. This paper was written based on this point. This paper aims to look at Korea's current support situation for the international environment regulation and to provide effective improvements.

3. Current Trends of International Environment Regulation

3.1 Concept and Type of International Environment Regulation

Many researchers define the concept of environmental regulation in various ways according to their research points. For example, Jun Keum Jung (1999) defines environment regulation as one of social/economic regulations, which contribute to realizing the government's aim to create a more desirable society by creating an appropriate atmosphere. However, Jun Hyun Hong (2001) looked at environment regulation from various perspectives, and defines it from

two perspectives. He defines it as government's or local government's public beneficial activities from an independent perspective, and also as public beneficial activities to prevent undesirable social results, such as a failure of market, social inequalities, environment destruction, which he looked at this concept from a purposive perspective.

Generally, environment regulation can be divided into two categories: Firstly, those which affect the trade with 240 Multilateral Environmental Agreements, such as the Climatic Change Convention, the Convention on Biological Diversity and etc.; Secondly, those which are performed in EU, US, Japan and etc. Individual country's trade regulations regarding the environment. Recently, environment regulation is divided into the following 3 categories regarding diversities and characteristics of environment related regulation: The first category is controls on greenhouse emissions, and ETS, regulation on vehicle fuel efficiency and emissions, and etc. all belong to this category; The second one is energy efficiency regulations, and regulations that emphasize energy efficiency, such as EuP, Indication of energy consumption efficiency grade compose the majority; The third one is harmful material regulation such as EU's REACH, US' RoHS, and ELV.

3.2 The Necessity of Taking Action against International Environment Regulation

Environment regulations recently tend to move on to TBT (Technical Barriers to Trade) so that individual countries can protect their own domestic industry by strengthening their environment regulation, instead of Multilateral Environmental Agreements, which makes it difficult for a mutual agreement.

As global concerns over environment protection is growing, various environment regulations are not only acting as an accelerator for a development of environmental industries, but also as an invisible trade barrier for market access. For example, EU, US and Japan are reinforcing their environmental standards in order to protect their domestic industries, and in cases of certain products failed to meet their standards, they are unilaterally taking actions to limit the trade. Consequently, not only small and medium-sized companies which are subject to environment regulation of major export countries such as EU and US, but also global corporations are exposed. (Refer to Table 1).

Table 1: Product environmental regulations in the US and EU sanctions case

			
<ul style="list-style-type: none"> • Samsung Electronics' computer keyboard • The US Federal Government's violation of the insecticide act 	<ul style="list-style-type: none"> • Mercedes-Benz • US' violation of CAFÉ (<i>corporate average fuel economy</i>) • Fine imposition of \$29.4 million 	<ul style="list-style-type: none"> • US Plizer • US' violation of food·medicine·cosmetic policy • Fine imposition of \$ 1.2 billion 	<ul style="list-style-type: none"> • US Palmer • EU's violation of cosmetic policy (containment of harmful substances) • Voluntarily recall

Source: Korea Institute of S&T Evaluation and Planning (2010), "Global environmental regulations based on industry trends and suggestions for building," p.5

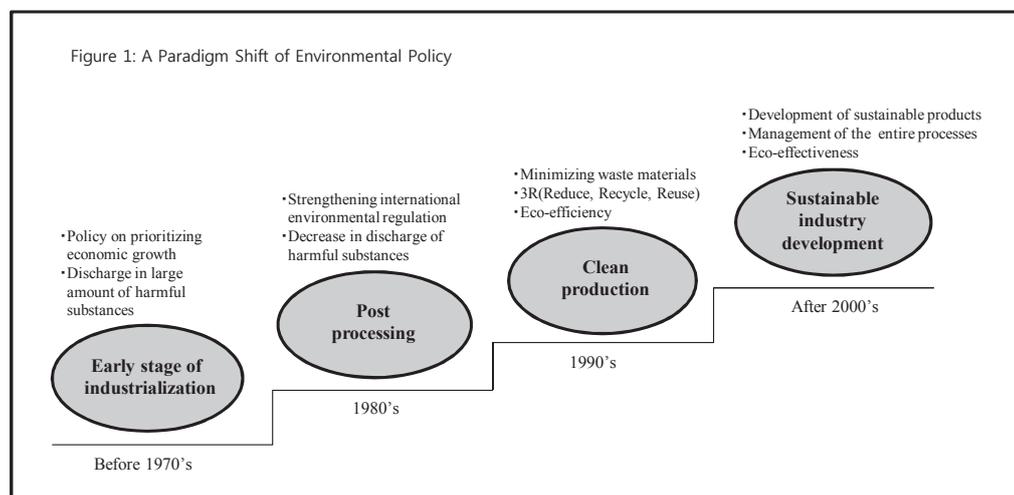
Also, most of the product-related international environment regulations are focused on Korea's major export industries, such as electric/electronic, vehicles, chemical industries. Therefore, countries that implement international environment regulation are Korea's major export countries. Korea's major export industries, such as electric/electronic, vehicles, chemical industries, which make up 56% of Korea's entire export, are exposed to the risks of international environment regulation. Hence, in consideration of Korea's economic structure in which export takes up a large portion, it is time to actively react to the trend of reinforcement in international environment regulation. In addition, when looking at these international environment regulations macroscopically, government's support for coping with international environment regulation should be reinforced, in that it protects the domestic industries and establishes eco-friendly industrial structure, not just for supporting individual companies because its ripple effect is so big that it is threatening export country's industrial structure.

3.3 Recent Trends of International Environment Regulation

Recently, in advanced countries, they are getting rid of previous post management, and started to utilize integrated risk management, which takes environmental influences in the entire processes of a product, from product manufacture to disposal and retrieval. To be specific, a rapid switch to environmental paradigm that considers environment in the entire product processes, and post management regulation such as the disposal of air pollutants or wastes, preventions of environment pollution, establishment of eco-friendly production processes, installation of environmental performance assessment, development of green product design, and EU's integrated product policy², has been taken place. Especially, in EU's IPP (Integrated Product Policy), Japan's Basic Law for Establishing the Recycling-based Society and US' CLM (Chemical Life-cycle Management), various measures have been taken to decrease the environment load that is generated in the entire product processes.

Figure 1 displayed this paradigm switch in environment policy in a diagram form. To be more specific, it can be inferred from this figure that there has been compound of various policies, such as a reinforcement of the environment policies based on the existing regulation-centered regulation, and an expansion of various inducements, not a totally new concept of environment regulation revision.

Figure 1: A Paradigm Shift of Environmental Policy

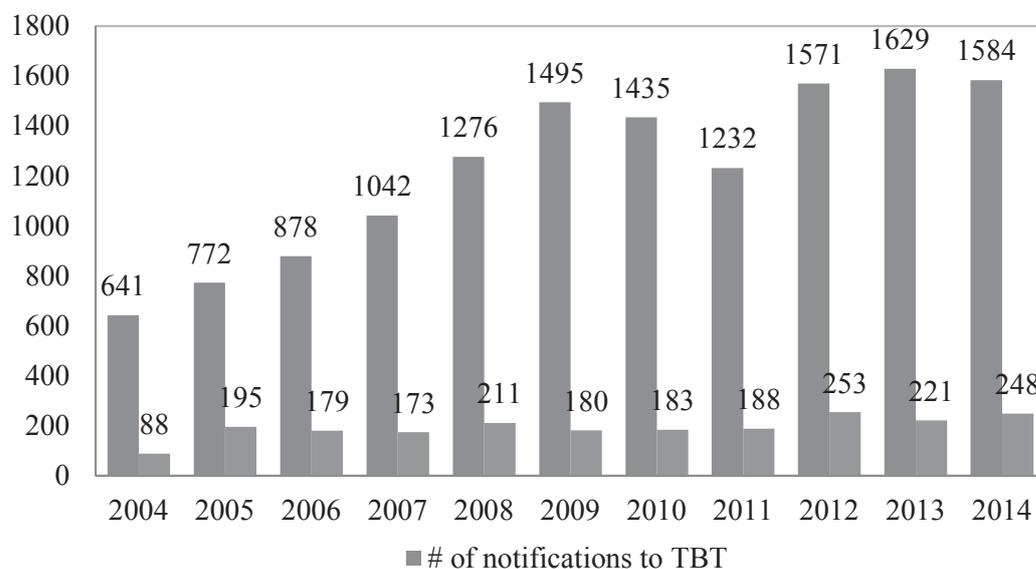


Source: Korea Institute of S&T Evaluation and Planning (2010). "Environmentally friendly industrial restructuring and development plan," p.42

Also, the main agent that takes the responsibility of environment pollution is changing from government to private companies who produce and export products. Especially, through the reinforcement of PL (Product Liability) and Polluter-Pays Principle the responsibility of environmental effect of a certain product is on manufacturer and importer. In the case of EU, with the enactment of REACH, the main agent that takes the responsibility of the organization of risk assessment foundation or the judgement of safety status of chemical substances has changed from government to individual companies, which all emphasizes the recognition of the importance of managing harmful chemical substances. Following this trend, the number of enactment of international environment regulation related legislation is increasing by 10-15% each year and it is being spread out throughout the world such as EU.

Let's look at the trend of major countries' international environment regulation. Figure 2 shows the progress of the number of notifications to TBT and notifications to TBT that are aimed to protect environment. According to this, the number of notifications from 2004 to 2014 is 13,535, and especially the number of notifications in 2013 was 1,629, which is the highest number after 2004. Among them, the number of notifications related to product standards aimed for environment protection and the number of notification related to technology regulation such as trial and certification was 88 in 2004. This number has shown to be more than doubled in the year of 2014, with 248 notifications.

Figure 2: Total TBT Notification Number and the Number of Environmental Protection Purposes



Source: Korea International Trade Association (2014), Korea Ministry of Trade, Industry and Energy (2015)

The TBT notifications reported to WTO can be categorized into two types, advanced countries and developing countries. As shown in Table 2, in 2014, with advanced countries' 17%, and developing countries' 83% (including poorest countries' 3%), the number of notifications of TBT in developing countries is rising when compared to those in advanced countries. Since 2007, while the number of notifications of TBT in advanced countries has decreased, there is a tendency that the TBT notifications in developing countries are increasing³. Especially, between the years of 2013 and 2014, the ratio of TBT notifications in developing countries is more than

70%, and this shows that there is a great progress of environment regulation in developing countries.

Table 2: Developed / developing country-specific trends TBT Notification Number (2008-2014)

Type of country \ Year	2008	2009	2010	2011	2012	2013	2014
Advanced country	411	278	280	259	309	325	257
Developing country	829	1,180	977	950	1,141	1,142	1,223
Poorest country	23	37	163	14	105	135	55

Source: Korea Ministry of Trade, Industry and Energy (2015)

Dividing TBT notifications by purpose, 'Protection of human health and safety' accounted more than half, with 91 notifications. This purpose is followed by 'Prevention of deceptive acts and consumer protection' (308 cases), 'Environment protection' (248 cases), and 'Quality control practices' (177 cases). These results show the trend of many countries introducing international environment regulation for protecting own nationals' safety or environment protection. Also, in cases of safety emergency situations occur, among TBT notifications, those that do not exceed 60 days, some processes, like gathering opinions (which is a matter of recommendation) can be omitted. (Article 2.10 of the TBT Agreement). This shows that there is an active enactment of new regulations. In addition, comparing the purposes of TBT notifications between advanced and developing countries, there are some discrete differences. While main purposes of notifications in advanced countries are protecting human health and safety, consumer protection, environment protection, those in developing countries are quality control practices, provision of consumer information⁴.

4. Korea's Present Support Situations of Reaction to International Environment Regulation and Countermeasures

4.1 Present Support Situations of Reaction to International Environment Regulation

Converted into Multiple Law systems, Korea's environment-related policies are operated by various regulation/support plans separately. Consequently, problems have recently emerged such as incongruity in systems, consumers' confusion in environmental awareness, and increase in the companies' costs of environmental responses. For example, encouraging the use of recycled products may lead to saving resource and decreasing the amount of waste. However, it may also cause negative consequences such as excessive use of chemical materials in product manufacturing, excessive emission of water and atmosphere pollutants and reduce in product's lifetime as its quality and efficiency declines.

While some policies are tried to switch to the risk-based system, there are implemental limitations such as absence of related evaluation techniques and database. Meanwhile, recently, some policies are arranging a risk-based system such as an introducing evaluation system that deals with the risks related to soil pollution or utilizing evaluation results that deal with the risks concerning the use of baby goods.

Furthermore, Korea has recently established new environmental regulations which are very

similar to EU's RoHS (WEEE) guidelines. However, these standards are somewhat inadequate, compared to those of major advanced countries such as EU, US, and Japan. Moreover, in Korea 'Act on the Resource Circulation of Electrical and Electronic Equipment and Vehicles (ECO-Assurance System)⁵' was enacted to apply the maximum limits of 6 types of chemical materials which was suggested and limited by RoHS.

However, at this point, these regulations are not strictly applied, unlike Europe's REACH regulations, therefore, the revision of Toxic Chemicals Control Act, a Korean version of REACH model is being pushed. The following is a brief arrangement of reinforcement in international environment regulations of several major advanced countries around the world.

Table 3: Environmental regulation policies of major countries

Country	Regulations and controls	Year of effectuation	Major contents
EU	ELV Directive	2000	Restrictions to the reusage of disused cars and the usage of certain metals
	WEEE (Waste Electrical and Electronic Equipment)	2005	Obligations to recovery and recycle of waste electrical and electronic equipments
	RoHS (Restriction of Hazardous Substances)	2006	Prohibition to containing 6 harmful substances in electrical and electronic equipments
	REACH	2007	Registration and permission to chemical substances
	EuP (Eco-design Requirements for Energy using Products)	2005	Setting an environmental evaluation standard in the entire processes of a product
US	CAFÉ (corporate average fuel economy)	1979	Regulations to vehicle average fuel economy
	California Waste Electrical and Electronic Equipment	2007	Charging on recycling waste electrical and electronic equipments
Japan	PC Recycle regulation	2003	Obligations to recovery and separate processing of harmful substances in PC
	home appliances recycle regulation	2006	Recovery and recycle of waste home appliances
	J-MOSS	2006	Obligations to the labeling of certain harmful substances in electrical and electronic equipments
China	RoHS	2007	Restrictions to the usage of lead, mercury, cadmium, hexavalent chrome, PBB, PBDE, etc.
	China WEEE	2011	Obligations to eco-design and recovery and processing of product information of electronic equipments
Korea	ECOAS	2008	Systematic organization of harmful substances information and its management
	Toxic Chemicals Control Act	1991	Registration and permission to chemical substances

Source: Government date from Ministry of Trade, Industry and Energy, Small and Medium Business Administration and Ministry of Environment, 2015

Meanwhile, in order to support companies for reacting effectively to environment regulations, the Ministry of Trade, Industry and Energy, the Ministry of Environment, and Small and Medium Business Administration are seeking for various support measures. To be more specific, since 2009, the Ministry of Trade, Industry and Energy is operating and managing 'Center

for supporting businesses with international environment regulation reaction', which performs a role of the key position in supporting small and medium-sized companies. Moreover, since the May of 2008, Cooperation with the Ministry of Environment, the Ministry of Trade, Industry and Energy constituted 'Joint bureau for REACH reaction' and is trying to apprehend the real condition of companies coping with environment regulations or hosting periodic events such as REACH EXPO.

The Ministry of Environment conducts integrated management of chemical materials based on REACH guidelines, and the Small and Medium Business Administration gives International Standards Certifications support work as one of their priorities. The following Table 4 organizes the above related ministries' specific supporting plans.

Table 4: Support Systems for International Environmental Regulations

Department of management	Name of business	Major support contents	Budget (hundred million won)	
			2014	2015
Ministry of Trade, Industry and Energy	Establishment of foundation to cope with international environmental regulations	Analyzing information related to international environmental regulations and consulting	6.2	7.5
	Development of global professional technology	Developing technology to cope with environmental regulations	196.2	205.7
	Informatization of industrial technology	Converting environmental regulations, certification information to DB	9.0	9.0
	Establishing foundation to manage chemical substances in small and medium-sized businesses	Establishing foundations to manage chemical substances	15.0	14.3
	Strengthening the skills of professional manpower	Training professional manpower in industry field	20.0	20.0
	Development of transportation system (Green car)	Development of core environmental technology	926.7	765.8
Small and Medium Business Administration	Establishing foundations to cope with overseas standard	Supporting certification (overseas standard, etc.)	136.1	168.1
	Strengthening the export competence of small and medium-sized businesses	Managing small and medium-sized businesses export support center	423.9	806.1
	Establishing foundations for overseas expansion in small and medium-sized businesses	Supporting small and medium-sized businesses' export	30.0	60.0
Ministry of Environment	Establishing export foundation of environmental industry	Establishing integrated information system related to international environmental regulation	140.7	143.6
		Providing information related to environmental industry environmental regulation		
		Providing consulting service		
	Coping with international environmental regulation	Training professional manpower to cope with international environmental regulation	4.8	4.8

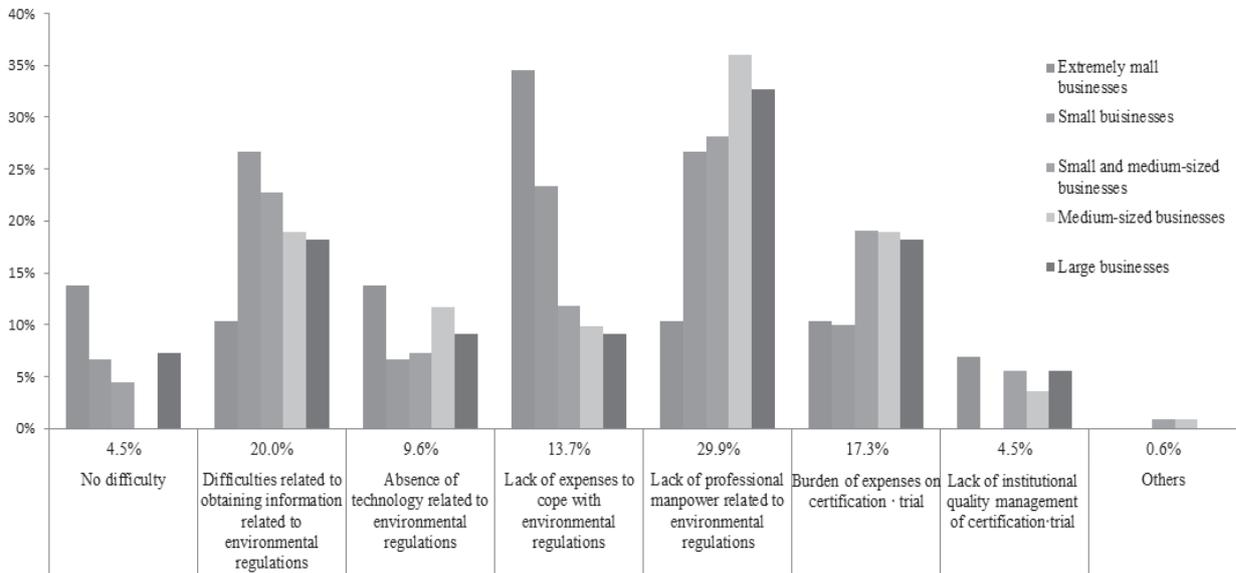
Source: Government data from Ministry of Trade, Industry and Energy, Small and Medium Business Administration and Ministry of Environment, 2015

Besides, Korean Trade Intelligence Agency as a specific department of the KTA (Korean Trade Association)-affiliated organization is responsible for businesses that are related to global international environment regulation. Since the March of 2006, through a program called 'Global Window Program', this agency is providing various information to numerous domestic companies, such as information over foreign companies' reaction to international environment regulation, the trends of international environment regulation in different foreign countries, and professionals' various opinions about the international environment regulation. Also, Business Institute for Sustainable Development, which is an organization affiliated with Korea Chamber of Commerce and Industry are supporting proceeding numerous businesses by establishing international environment regulation coping system through utilizing the internet, implementation of environmental education, publication of international environment regulation coping guidebook. In order to manage EU's End-of-Life Vehicle Directive (ELV) jointly, Korea Automobile Manufacturers Association (KAMA) is implementing/operating Automobile Recycling Working Group or supporting the establishment of International Material Data System⁶.

4.2 Domestic Companies' Actions to International Environment Regulation

Most companies have made self-supporting efforts to cope with international environment regulation. In case of large companies, there exist specialized departments charged of the international environment regulation. Therefore, they can actively cope with international environment regulation such as RoHS guidelines or REACH regulation⁷.

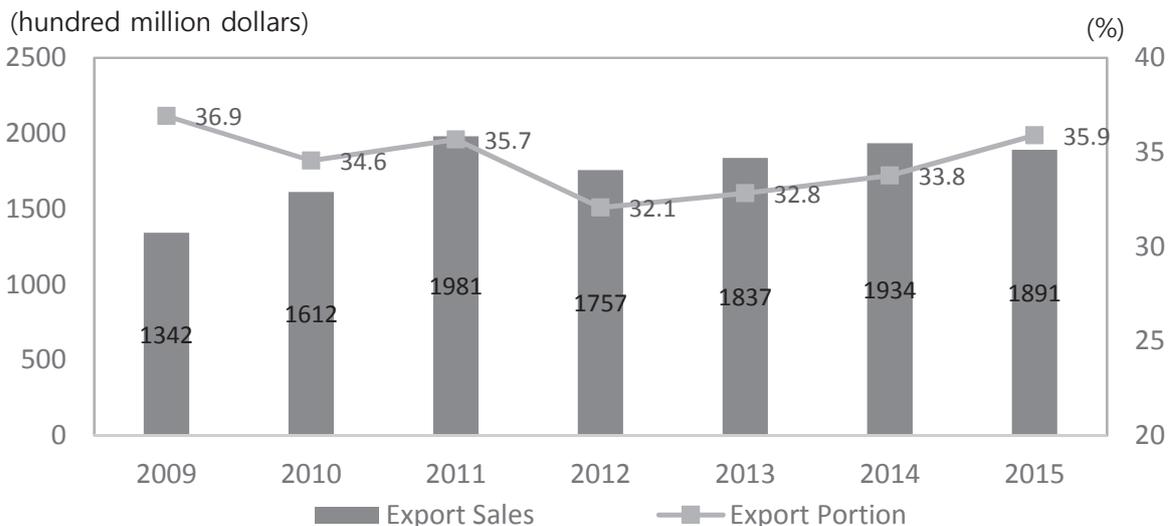
On the other hand, because of the burden of expense, small and medium-sized businesses have difficulties in obtaining information related to environment regulation, and low level of awareness, they face hardship in coping autonomously with international environment regulation. One example of them is the following: On the March of 2014, according to the findings of Korea Federation of Small Businesses, approximately 23.5% of small and medium-sized businesses are facing difficulties in coping with international environment regulation, and especially those difficulties include the following: insufficiency in environment related information and lack of professional manpower (49.9%), burden of expenses, such as expenses in acquiring certification of overseas standard (31%)⁸.

Figure 3: Barriers to International Environmental Regulations by Company Size

Source: Korea Federation of SMEs (2014)

4.3 Countermeasures against International Environment Regulations of Korea Manufacturing Firms

According to the report, the change of world trade structure and Korea trade, issued by Korea International Trade Association in 2016, Korea's trade structure has been moving similar to the way of the world trade trend change like rising portion of consumer goods export, spreading of e-commerce export, increasing export rate of SMEs. Especially, export rate of SMEs which account for 87.9% (13,422 thousand people) of the entire employed population, are on the rise, going from 32.1% in 2012 to 33.8% in 2014, and 35.9% in 2015(see, Figure 4). This figure also shows that export portion of Korea's SMEs has continued to increase since 2012.

Figure 4: Export Sales and Portion of Korea SMEs

Source: Korea Small and Medium Business Administration (<http://stat2.smba.go.kr/>)

In addition, diversification of export items in the world market have been leading a downtrend 13 items of our mainstay export items, from 80.2% in 2011 to 78.6% in 2015. 10 items except semiconductor item, general machinery item and computer item also have been declining in the global market share. What's more serious is that about 90% of the major 13 export items have been including in the international environmental regulations. Furthermore, Korea's SMEs are hardly respond in their own capacity due to the lack of their response capabilities such as environment regulation related information, shortage of funds.

4.4 Tasks and Countermeasures for Coping with International Environment Regulation

As stated above, considering Korea's current supporting situation of coping with international environment regulation, the current system's tasks can be drawn like the following:

Firstly, when compared to several advanced countries, in Korea, the law system to strengthen the international environment regulation is not properly organized. As explained above, a domestic company with a low level of international environment regulation cannot meet foreign country's high one. Therefore, it is strongly necessary to organize the law system that appropriately reflects the current tendency in international environment regulation.

Secondly, considering that products are becoming eco-friendly, we need to reconsider validity of government's supporting policies, such as reinforcement in companies' research and development abilities, management of products' life cycle in markets and urgency in coping with international environment regulation.

Thirdly, when it comes to coping with international environment regulation, there exists a gap between large companies and small and medium-sized companies. Generally, the reinforcement in international environment regulation is directly connected to the competitiveness of company's products. Therefore, many companies devote themselves to developing eco-friendly products or enhancing environment efficiency. On the other hand, small and medium-sized export companies which are material/component companies under the Supply Chain, not only have low awareness of international environment regulation, but also they cannot afford to make technical development because of their low technical skills and funding power.

Meanwhile, the countermeasure for the above tasks are as follows:

Firstly, in consideration of domestic industries' capacity regarding the environment regulation, the level of domestic environment regulation should be enhanced gradually, stage by stage. Especially, when considering that domestic small and medium-sized businesses have low level of coping skills with environment, indiscriminate reinforcement in environment regulation may bring about recession in the certain industry. Therefore, instead of unilateral introduction of regulation, international environment regulation should be done with consideration of green competence of a certain industry or a domestic company. In other words, a desirable introduction of regulation ought to be done with a thorough understanding of that regulation and through a gradual stage by stage process. This will help the regulation to be successfully and smoothly applied into production system.

Secondly, at government level, through providing a service that enables to obtain and analyze information related to environment regulation, we should enhance domestic companies' reaction capabilities. Especially, in cases of small and medium-sized businesses, their level of awareness regarding international environment regulation is very low. Therefore, government should aid companies with enhancing their reaction skills to environment regulation. For

example, government may help companies with the following tasks: examining the contents of various environment regulation that major advanced countries are implementing; or analyzing factors that may affect company's environment management. Also, through a continuous monitoring of information that is related to environment regulation, necessary countermeasures should be prepared and also, risks that may be caused by international environment regulation should be minimized.

Thirdly, since there exists a discrepancy between large companies and small and medium-sized companies in the interest level of reaction to environment regulation or reaction direction, government's countermeasures should be organized in consideration of the size of a company. Above all, when considering that most of material/component industries that are under products' Supply Chain are small and medium-sized export enterprise, the existing environmental management promotion plans that is centered upon large companies should be expanded so that establishment of environmental management system for small and medium-sized businesses can be supported. For the coexistence of large companies and small and medium-sized companies, joint development support for environment technology or tax credit for investments of reaction to environment regulation can be good examples.

Fourthly, as the recent movement of international standardization in the environmental field is being visualized, countermeasures for the standardization in certification of Korea's KS should be arranged. Especially, for domestic small and medium-sized businesses whose foundation of environmental management is weak, international standard in the environment field may act as a new technical barrier to trade. According to a recent survey done by Korean Trade Association, the number of small and medium-sized export companies in 2015 was approximately 90,000, and among these, the number of small and medium-sized companies with ISO 14001 certification was only 28,260⁹. As the competition between companies are becoming more and more fierce world widely, in order for small and medium-sized export enterprise to lead the technology development related to environment and to create new markets, it is important to improve their reaction skills to international standardization. Hence, taking advantage of the following support plans: existing programs to train experts of international standardization or support systems for acquisition costs ISO certification (Subsidization of 30-50 % of certification acquisition costs); may be a good method.

5. Conclusion

We analyzed Korea's support situations for coping with environment regulations, among the strong trend of reinforcement in global environment regulation. Also, based on these results, we tried to draw some effective improvement plans. While environment regulations are reinforced globally, the results of analysis of Korea's support situations for coping with environment regulations are as follows.

Firstly, our legal system to strengthen the international environment regulation is yet insufficient when compared to those of several advanced countries. As stated earlier, countries who have a low level of international environment regulation face difficulties when they try to meet the other countries' high-level environment regulation. This emphasizes the importance of appropriate organization of legal system to appropriately react to the trend of reinforcement in international environment regulation.

Secondly, in terms of international environment regulation, there exist some amount of gaps between large companies and small and medium sized companies. Especially, in case of small and medium-sized export companies, their level of recognition of international environment regulation is very low and also because of their low technical skills and funding power, they cannot afford for technical development. Therefore, with connection to large companies' existing environmental management promotion plans, we need to support the establishment of environmental management system for small and medium-sized companies. Plans such as joint environmental technology development support or tax credit for the investment of environmental regulation are some of the great examples for the coexistence of large companies and small and medium-sized companies

Thirdly, since there is a strong movement of standardization in environmental regulation, we need to strengthen the countermeasures for the standardization of Korea's KS accreditation standard. According to the recent investigation by KTA (Korean Trade Association), the number of small and medium-sized export companies in 2015 was approximately 90,000, and among them, the number of companies that possessed ISO 14001 certification was only 28,260. Therefore, we need to actively utilize supporting plans such as training programs for the professionals of international standardization or aiding some amount of ISO certification acquisition costs.

Lastly, we ought to come up with a joint response system so that we can support the countermeasures to international environment regulation of foreign companies. One example of this might be Japan's JBCE. JBCE collects and provides information related to international environment regulation in EU, and publishes analysis reports of international environment regulation. Moreover, it represents Japanese companies' interests through lobbying activities in EU-related organizations. Meanwhile, in Korea, there exist no communal organizations of domestic companies like in Japan. However, through EICTA, we merely state our companies' opinions to EU government in an indirect way. Therefore, benchmarking one operation cases of Japan's JBCE should be thoroughly reviewed as one of the many relevant choices.

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¹ Korea Ministry of Trade, Industry and Energy (Korea), "2014 Report on Technical Barriers to Trade (TBT Report)", April 2015, p.7.

² The EU integrated product policy (IPP) is, in view of all of the steps of the product life cycle policy for the purpose of minimizing the environmental impact resulting from the product. Here, one advantage of the voluntary measures and regulatory and economic methods or environmental labeling and product design guidelines, such as various policy approach for each stage of the product life cycle, raw materials extraction, production, distribution / sale, use and disposal / recycling the plan has been presented.

³ It is TBT notification portion for the purpose of environmental protection in developed countries decline appears to be because, not because it is environment-related technical regulations are weakened and

relatively also enhances other technical regulations (Korea International Trade Association, "The Impacts of Environmental Regulations on Competitiveness", Trade Focus 13(1), January 2014, p.5).

- ⁴ Korea Ministry of Trade, Industry and Energy (Korea), "2014 Report on Technical Barriers to Trade (TBT Report)", April 2015, p.11.
- ⁵ What it was done from January 2008 Environmental security system, which applies the 'electrical and electronic products and the Act on Recycling of cars' on TV, refrigerator, washing machine, etc. Electrical and Electronic Products 10 species and more than 3.5t freight cars along the EU car including the WEEE Directive, RoHS Directive, prescribes almost the same content and the ELV Directive.
- ⁶ Jung, Bongjin and Kwiho Lee (2010), "Current Status of Countermeasure for Overcoming the International Regulations in Korea", Clean Technology 16(3), September 2010, p.159.
- ⁷ Representing Korea, Samsung Electronics, LG Electronics and other international Environmental regulations (RoHS, REACH, etc.) Establishing a management information system has been built within an efficient management system of product information material. Only as the operating system for green purchasing and supplier management, technical support and harmful. It has been to build a win-win management systems such as materials management techniques taught.
- ⁸ Korea Federation of SMEs, "2014 Export SME Survey of International Environmental Regulations", March 2014, p.20.
- ⁹ Korea International Trade Association, "Small and medium export enterprises in the international environmental management standard and Utilization Strategy", Trade Focus 14(30), August 2015, p.4.

References

- Amagai, Hisashi (2007): "Environmental Regulation and Competitive Strategy: Review of the Porter Hypothesis", *Soka Business Review*, 31, No.1-2, pp.23-33.
- Aoki, Masamitsu (2005): "Environmental Regulation Trends and the Corresponding State of the World", *Journal of Electronics Mounting*, 8, No.5, pp.24-32.
- Compliance in Advance and Supporting System (<http://www.compass.or.kr>).
- Doh, Kwonwoo and Hwanil Park (2010): "The Emergence of Green Protectionism and Countermeasures", SERI Issue Paper, pp.1-38.
- Hamamoto, Mitsutsugu (1998): "Industrial Productivity and Environmental Regulations", *Economic Journal*, 162, No.3, pp.51-62.
- Jung, Bongjin and Kwiho Lee (2010): "Current Status of Countermeasure for Overcoming the International Regulations in Korea", *Clean Technology*, 16, No.3, pp.151-161.
- Kang, Sanggoo and Yongkeun Lee (2013): "Korean Counterplans regarding Environmental Regulations in Major Trading Countries-Focused on the Electrical and Electronics Industries", *E-Trade Review*, 11, No.3, pp.121-142.
- Korea Federation of SMEs (2014): "2014 Export SME Survey of International Environmental Regulations".
- Korea Small and Medium Business Administration (<http://stat2.smba.go.kr>).
- Korea Institute of S&T Evaluation and Planning (2010): "Global Environmental Regulations Based on Industry Trends and Suggestions for Building".

- Korea International Trade Association (2014): "The Impacts of Environmental Regulations on Competitiveness", *Trade Focus*, 13, No.1, pp.1-33.
- ____ (2015): "Small and Medium Export Enterprises in the International Environmental Management Standard and Utilization Strategy", *Trade Focus*, 14, No.30, pp.1-22.
- Korea Ministry of Trade, Industry and Energy (2015): "2014 Report on Technical Barriers to Trade (TBT Report)".
- ____ (2013): "2013-2014 Korea's Major Industries, Regional Trade Environmental Regulations Guidelines".
- Lim, Jongsub and Junhyeong Lim (2011): "A Study on Korean Enterprise's Counter Strategy for Corresponding to Environmental Regulations for International Trade", *Review of business & economics*, 24, No.2, pp.823-844.
- Min, Hyeok ki (2010): "Current Status of Countermeasure for Overcoming the International Regulations in Korea", *KIET Industrial Economic Review*, pp.40-49.
- Ministry of Economy Trade and Industry (Japan) (2014): "Unfair Trade Report 2014".
- Ministry of Economy Trade and Industry (Japan) (2014): "Job Creation and Growth Strategies in Accordance with the International Standard of Play, Energy Saving".
- Nam, Jeongwoo (2015): "A Study on Environmental Management Strategy due to the Global Environmental Regulation: A Focusing on Comparative Study of Korea and Japan", *SERI Issue Paper*, 67, pp.85-109.
- Tomoni, Toyozumi (2006): "Eco Business Expansion Strategy", *Human Environmental Studies*, 5, No.1, pp.115-134.
- Ueda, Kazuhiro and Minoru Shimamoto (2007): "Green Innovation. Chuokeizai-sha".
- WTO (2015): "TBT Annual Review (2004-2014)".
- Yun, Kwangwoon and Seongho Kim (2013): "The Relationship of International Environmental Regulation, GSCM (Green Supply Chain Management) Practices and Performance of Korean Exporting Firms: A Focus on RoHS (Restrictions of the use of Hazardous Substances)", *Review of Business & Economics*, 26, No.2, pp.1009-1032.