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<https://hdl.handle.net/2324/17904>

出版情報 : Journal of Novel Carbon Resource Sciences. 1, pp.6-13, 2010-03. 九州大学グローバル
COE プログラム拠点「新炭素資源学」事務局

バージョン :

権利関係 :



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(Received October 30, 2009; accepted January 26, 2010)

This paper analyses the complex function of the 'world environmental market' created by public intervention for dealing with global warming. And it looks at how a developing country, as an environmental latecomer, can take advantage of a world environmental market—an institution that did not exist during the industrialization of the forerunner countries.

1. Introduction

Human development can be considered as a process of overcoming economic activities' constraints imposed by resource limitation. As a measure to overcome these constraints, the spatial expansion of activity areas is one way of seeking to do this. Environmental problems, another constraint of economic activities, are no exception.

The purposes of this paper are the following. First, complex function of the world environmental market is clarified from the historical perspective of international sourcing. The world environmental market was created by public intervention as a measure to address resource problems. Second, different impacts on developing countries by measures to alleviate a third resource problem in the current global economy are examined and compared with other measures to address past resource problems.

Currently, global environmental problems are drawing global attention. Particularly, global warming issues and the reduction of greenhouse gas (GHG) emissions are regarded as serious and urgent matters^(*). From the late 1990s, an unprecedented global environmental policy has been implemented. This is an environmental policy using global market mechanisms known as market-based instruments. Specifically, the mechanisms comprise three channels of the Kyoto mechanisms under the Kyoto protocol ("Emissions Trading", "Clean Development Mechanism (CDM)", and "Joint Implementation (JI)") and negotiation of trade liberalization of the "Environmental Goods and Services (EG&S)" at the WTO^(*). Such market measures are the only effective global environmental policies to address global warming issues (Hino, 2009).

This paper specifically examines CDM, which is a market-based instrument. Research on the actual status and institutional issues of CDM has been undertaken (e.g. Ellis, 2006; Hino, 2007b), although its relations with the development of developing countries have been discussed. Arquit Niederberger and Saner (2005) reviewed differences in the determinants between direct investment and CDM investment, and argued that CDM supports the expansion of investment into developing countries. This paper reviews the potential role of CDM as an institutional tool to realize latecomer's advantage in the historical development of international sourcing.

Specifically addressing the problems related to resources as a part of the environmental problems, this paper presents a discussion of the origin of international sourcing in terms of cost and institutional factors. The issues related to resources are associated with increased costs of obtaining resources resulting from changes in the demand and supply balance of resources. As described herein, these problems are designated as resource problems. This analytical perspective enables us to examine developing countries specifically, which are primary resource suppliers. It clarifies the historical position of developing countries in the world economy and provides some political implications surrounding issues related to their development and environment in the modern world economy.

It is noteworthy that issues associated with the development of developing countries and environment must be understood in the context of historical changes of the world economy. Economic policies in developing countries have not always been determined based on their own political parameters. Rather, their policies were heavily influenced by global economic management that was led primarily by developed countries; recently, that trend is changing.

This paper is structured as follows. Section II examines countermeasures against resource problems and their development history. In Section III, the relations between latecomers' advantages and the world environmental market are discussed. Section IV concludes this paper and presents future issues.

2. Three resource problem types and their countermeasures

2.1 Resource problems and international sourcing

The expansion of economic activities produces constraints on economic activities. The quantitative expansion of economic activities after the industrial revolution is well known to have caused the accumulation of CO₂ in the atmosphere, which creates today's global warming phenomena. Furthermore, the expansion of economic activities has created issues of output as well as issues of input.

Ricardo (1819) addressed resource problems in terms of economic development. He explained that foreign trade functioned as a measure to avert extraction of the

capitalists' reward, their profit, from increases in food prices.

These days, the importance of agriculture in economic activities is declining, whereas productivity growth achieved through industry is becoming the source of wealth. In this society, the unlimited expansion of economic activities compelled us to recognize again the importance of resource problems. In other words, the expansion of economic activities causes rapid consumption or supply shortages of resources, engenders change in the demand and supply balance, and increases in resource prices. For that reason, it cuts corporate profits.

As Ricardo (1819) argued, when nation-states served as the basis for economic activities, resources were sought within a country. However, the increased utilization of resources brought forth resource problems of three types in the past; the international economic activities were adopted to solve them^(*). The international sourcing of resources required formation of resource production sites and resource trade. Furthermore, institutions came to be associated with these activities.

The resource problems of three types include classic resource problems, pollutant emission problems, and GHG emission problems. These issues are examined in detail below.

2.2 Historic development of international sourcing

2.2.1 Classic resource problems

Great Britain after the Napoleonic wars, when Ricardo was living, experienced shortages of food and cotton because of the rapid increase of productivity and expansion of production. They experienced shortages of natural resources and land with which to produce food. They confronted the urgent necessity for a continuous supply of bulk resources. For convenience, resource problems of this type, which arose from the rapid increase in productivity after the Industrial Revolution, are designated as "classic resource problems" in this paper.

Measures to address classic resource problems were not taken solely through market mechanisms. The theory of comparative advantage proved the economic rationality of production activities as the essence of trade. Trade could not be established without foreign countries, which can constantly supply large amounts of resources. However, the production of resources is susceptible to natural conditions, and it is not easy to provide an adequate supply constantly. It should not be overlooked that the supply side was created by public intervention, which is the opposite of a market mechanism, to realize trade that enables a stable supply of resources. In other words, the tighter the country was closed, or the harder it was to organize productivity action and entrench it at a local level, the more imperialism forming the world system at that time forced the country to supply resources (Cain and Hopkins, 2002).

The countries that supplied resources were mainly latecomers that had expanded from Europe to North America, Latin America, South Africa, and Asia. Particularly, renewable resources such as agriculture and forestry were produced at low cost on plantations owned by foreigners in various colonies^(*).

2.2.2 Pollutant emission problems

The second resource problem is related to sourcing of resources as a place for pollutant emissions among developed countries, which experienced rapid economic growth from the late 1960s. The developed countries in those days were gradually tightening environmental regulations as a countermeasure to address damage caused by pollution. Consequently, the cost for obtaining resources as a place of pollutant emission, which were previously free goods, had increased. The resources here meant free goods for which market trading had not been established. These free goods were necessary for human activities. However, as pollutant emissions increased from corporate activities, the consumption of these free goods increased to the degree that destroyed a certain arrangement that provided utility to human beings^(*). Consequently, the quantity of the free goods supply decreased, and these decreased free goods were consumed along with economic activities. In this sense, they could be considered as necessary inputs for economic activities, just as natural resources had been. The cost to obtain normal goods would naturally rise along with the changes in demand and supply based on the market mechanism. However, this mechanism does not work for free goods. The free goods, which had been costless before, suddenly became costly as a result of public intervention. To avoid strict domestic environmental regulations and environmental expenditures and to avoid changing existing production activities, corporations in developed countries undertook direct investment and transferred their polluting industries or pollution-intensive processes overseas. This is the so-called export of pollution.

Many studies have been conducted to examine pollution export phenomena. Particularly, the "Pollution Haven Hypothesis" has been examined intensively from theoretical and empirical perspectives. Variations of the Pollution Haven Hypothesis^(*) do exist, of which, the key interest for this paper is the issue related to the "option to choose trade". That is, the option to deliver goods (pollution intensive goods) to consumers whether by producing them within the country or by producing them in countries with low environmental regulations and bringing them back to the home country.

It is noteworthy that the Pollution Haven Hypothesis tends not to be supported by empirical analyses—as exemplified by the study of Eskeland and Harrison (1997)—because multinational corporations often have better environmental technologies than corporations in developing countries do. The multinational corporations also tend to regard the quality of environment and safety at work more highly. Indeed, these days, multinational corporations are more likely to be proactive on environmental problems from a corporate social responsibility (CSR) perspective. Society is also devoting attention to such corporations as major actors leading innovation in environmental fields (OECD, 2007). For multinational corporations, environmental expenditures among total production costs are miniscule: they do not constitute a determinant of production-site transfer decisions^(*).

However, the Pollution Haven Hypothesis is supported

by case studies of individual incidents. A famous example is the “Bhopal disaster”. The Bhopal disaster was the 1984 incident in which a large amount of toxic gas was released from a pesticide plant operated by a subsidiary of the US’ Union Carbide Corp. in Bhopal, India. Other examples include the “Malaysia ARE case” which took place in Malaysia during the 1970s^(*), construction of an iron ore sintering plant in Mindanao Island in the Philippines, and transfer of a hexavalent chromium plant to Ulsan in Korea. Furthermore, according to Levinson and Taylor (2008), in the 1970s and 1980s in the US, the industry whose costs were increased most by environmental regulation had the largest increases in net imports, indicating that some corporations in developed countries “exported pollution” during the 1970s to the 1980s to avoid profit cuts incurred by pollution abatement costs, no matter how small the pollution abatement costs were among overall entire production costs. This can be considered true in spite of the situation prevailing these days, when CSRs are increasingly active as global environmental concerns rise^(*).

As described above, host countries were used as the destination for pollution exports. However, this expression “used” might be inappropriate: the host countries often took advantage of the regulatory gap by intentionally lowering their environmental standards or loosening regulations to attract multinational corporations (Miyamoto, 1995). The destination for the export of pollutants needed minimum industrial infrastructure to operate the plants. As in the case with the construction of the PASAR copper smelter on Leyte Island in the Philippines, Official Development Assistance (ODA) funds were used to build a plant for the operation of modern industry. The destination for the export of pollutants can be any country that can obtain resources as a place of pollutant emission at a lower cost than in their own. Consequently, few cases exist in which developed countries became the destination^(*).

2.2.3 GHG emission problems

a. The third resource problem and creation of the world environmental market

The third resource problem is that of obtaining resources as a place for GHG emission. As with the second resource problem, the third problem arises in relation to obtaining the resources as the place of pollutant emissions. However, they differ in terms of the pollutant type. The second resource problem is about hazardous pollutants. The GHG, the third resource problem, is not hazardous on its own but its concentrated existence in the air is harmful to the environment. The process of consuming free goods is more indirect than with other pollutants. For this reason, obtaining the resources internationally was less controversial than the other pollutant problems; therefore, it was the more adequate resources to obtain internationally. Meanwhile, because GHGs themselves are not hazardous, no need arose to obtain the resources internationally unless society focused serious attention on it.

However, based on negotiations among governments, the Kyoto protocol was developed in response to the GHG emission. Consequently, the reduction in GHG emissions

became a corporate social responsibility. Along with it, the Kyoto mechanisms were established to enable the purchase of resources as a place for GHG emissions from a global market. This global market, which was created by public intervention to address the third resource problem, is called a “world environmental market” in this paper^(*). In the Kyoto mechanisms, the Joint Implementation (JI) corresponds to the Annex I countries, and the Clean Development Mechanism (CDM) corresponds to the Non Annex I countries. In other words, this is the global market to address environmental problems. It is an international place in which countries can trade rights to pollutant emissions that can not be traded in a usual market. It adds economic value to resources as a place for GHG emissions, which does not exist in the usual market. If a corporation can produce resources as a place for GHG emission at less cost than purchasing such resources, they are motivated to produce those resources independently. In other words, they have an opportunity to reform their current production activities. They can choose whether they will obtain the resources or use overseas production activities with the Kyoto mechanisms if the corporations decide not to do so. Therefore, this institution enables corporation to maintain existing production activities in one way or another. In this sense, the Kyoto mechanisms are an important means to reduce production costs of resources as a place for GHG emissions and to avoid squeezing corporate profits. The necessity of obtaining resources through overseas production activities depends on each corporation’s productivity of the resources as a place for GHG emission and the market-trading price. Consequently, such necessity is not determined by the supply and demand balance of resources as a place for GHG emission. It should not be overlooked that economic value was added to the resources as a place for GHG emission because of the changes in the supply and demand balance of the free goods.

b. Actual situation of the world environmental market

After establishment of the Kyoto Protocol, several markets to address GHG emission problems were created through regional initiatives, in addition to the world environmental market. Those markets, which include the world environmental market for various actors in world size, and the regional markets for the regional actors, are called carbon markets.

Following is a review of the actual situation of the world environmental market and the carbon markets. Table 1 presents transaction values and the volume of trade in these markets. As of 2008, the total transaction value was US\$126.3 billion and the volume of trade was 4.8 billion MtCO₂eq. Table 1 shows that EU-ETS occupies more than half of the transaction value and the volume of trade. Its growth rate is also rapid. It is noteworthy, however, that the world environmental market—which comprises Certified Emission Reduction (CER) certified by CDM, Emission Reduction Units (ERU) certified by JI, and Assigned Amount Unit (AAU)—also has large transaction values and trading volume. Its growth rate is actually larger than those of EU-ETS. In terms of the breakdown of the world environmental market, the trading of CER

Table 1 Trading scale of carbon market (MUS dollars, MtCO₂eq)

	2007		2008	
	Transaction value	Transaction amount	Transaction value	Transaction amount
EU-ETS	49065	2060	91910	3093
World environmental market	13383	833	33301	1499
CER	12884	792	32796	1461
(Primary CDM)	(7433)	(552)	(6519)	(389)
(Secondary CDM)	(5451)	(240)	(26277)	(1072)
ERU	499	41	294	20
AAU	n.a.	n.a.	211	18
Voluntary market	263	43	397	54
NSW	224	25	183	31
CCX	72	23	309	69
RGGI	n.a.	n.a.	246	65
Total	63007	2984	126345	4811

Note) CER means certified emission reduction, ERU means Emission Reduction Unit, AAU means Assigned Amount Unit, NSW means North South Wales, CCX means Chicago Climate Exchange, and RGGI means Regional Greenhouse Gas Initiative.

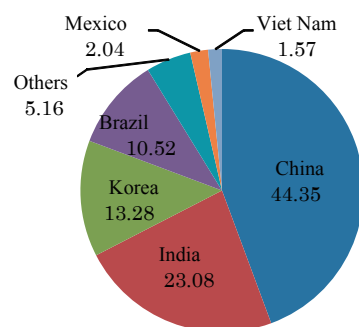
Source) World Bank (2009).

occupies the largest percentage. Particularly, secondary CDM trading is the driving power of recent growth.

Figure 1 shows the share of CER issuance by country. The issuance of CER is related to funds transfer. Figure 1 shows that China, India, Brazil, and South Korea occupy most of the share. Figure 2 shows the number of CDM projects, which is related to the frequency of technology transfer. Figure 2 shows that China, India, Brazil, and Mexico have numerous projects, indicating that CDM is mainly used by China, India, Brazil, South Korea, and Mexico.

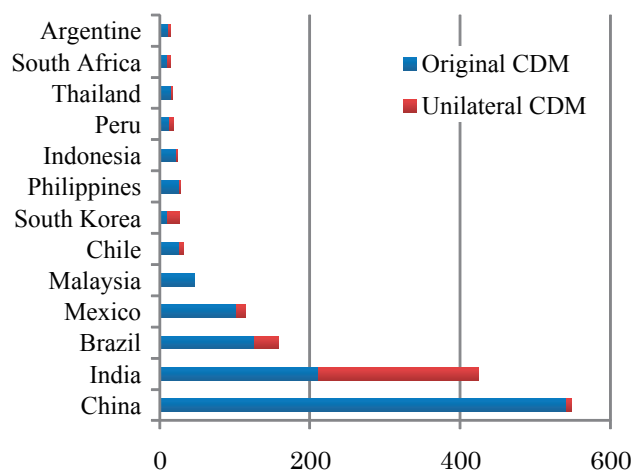
The number of unilateral CDM projects is also high among some of these countries. The unilateral CDM project refers to those CDM projects without technology transfer and prior funds provision from the Annex I countries. The main purpose of CDM is to achieve “sustainable development” of developing countries through technology and funds transfer from the Annex I countries. The large number of unilateral CDM projects indicates that some countries are using the CDM in ways that exceed initial expectations. Figure 2 shows that India has the most projects, followed by Brazil and Mexico. South Korea is a unique case: its total number of projects is not so large, but more than half are unilateral CDM projects. Unilateral CDM projects require the use of domestic technology and funds, and countries that have the capacity to meet these requirements are increasing their numbers of CDM projects.

As described above, the resources in the world environmental market are also supplied by developing countries, as are cases with classic resource problems and the pollutant emission problems. However, unlike the classic resource and pollutant emission problems, the resources in the world environmental market are supplied by the countries that are already industrialized to some degree or which have a certain industrial infrastructure.

**Fig. 1** Share of CER issuance by country (%).

Note) As of May 20, 2009.

Source) UNFCCC web-site (<http://cdm.unfccc.int/>)

**Fig. 2** Number of CDM projects by country.

Note) As of May 20, 2009

Source) UNFCCC website (<http://cdm.unfccc.int/>)

These countries have multiple and inexpensive businesses as well as conducive institutional capacity and business environment for CDM projects⁽¹²⁾. With international sourcing of the resources, the environmental technology and funds for producing resources will be transferred to these countries.

3. Latecomer's advantage and the world environmental market

3.1 Double aspect of the latecomer's advantages

This section addresses the relations between environmental problems and the "latecomer's advantages (and disadvantages)". It is noteworthy that several studies of "latecomer's advantages" have already been conducted, for example, by O'Connor (1994) and Fujisaki (1994). This paper does not discuss details of these studies. The purpose is rather to arrange the significance of the latecomers' advantages suggested by Gerschenkron (1962) and to clarify their double aspect that is useful for the field of environmental problems.

Gerschenkron (1962) postulated latecomers' advantages as overcoming the shortcomings of the precedent conditions of industrialization. According to him, the backwardness of the latecomers was compensated by the shortcomings of the conditions. He argued that the greater the shortcomings were, the more rapidly the industrialization can be achieved by latecomers. Borrowed technology from developed countries is a good example for helping them to achieve industrialization rapidly⁽¹³⁾. However, from an actual global economic perspective, it seems that the accumulation of backwardness is not necessarily a latecomer's advantage. In fact, it might be to their disadvantage. For example, the more backward the country's economy is, the larger is the amount of investment required for industrialization. Gerschenkron (1962) also suggested application of institutional instruments as a factor to realize the latecomers' advantages. According to him, to realize the latecomers' advantages, it was necessary to create and apply new institutional instruments that were not established in the industrialization process in developed countries⁽¹⁴⁾.

The latecomer's advantage is a concept associated with industrialization, as described above. Therefore, questioning the "realization of alternatives" is beyond the discussion of latecomers' advantages (Miyamoto, 1995). Nevertheless, the fact that the terminology, "latecomers' advantages", is still used in today's discussion reflects that industrialization remains high priority for developing countries.

Gerschenkron (1962) postulated that the conditions for industrialization in the 19th century were uniform. However, these days, the environment surrounding the latecomers is changing concomitantly with the changes of the global economy structure. As such, the condition of the modern industrialization can be expected to be changing as well. For example, environmental measures for sustainable development have been added as a new condition to the preceding conditions. Therefore, when examining the latecomers' advantages based on the condition of industrialization, the "latecomer's

disadvantage", which was created using a newly added condition of mandatory environmental consideration, should be the premise of the discussion. This aspect of the latecomer's advantage is applicable in the field of environmental problems. The typical example of this would be environmental measures that developing countries need to take to respond to "diversity of environmental problems" (Hino, 2009)⁽¹⁵⁾, namely multiple environmental problems that exist in the modern global economy. It is noteworthy, however, that if the innate nature of measures against environmental concerns are undertaken to assure sustainable development, they might not necessarily be disadvantages to developing countries in the middle and long run.

Gerschenkron's latecomer's advantage is a concept explaining differences in the economic performance during the industrialization process of latecomer countries and that of advanced countries. Gerschenkron (1962) called this discontinuous improvement of economic performance a "big spurt" and distinguished it from the concept of "take off", as conceptualized by Rostow (1960). In the environment field, his concept is used to explain intermittent and discontinuous improvement of environmental performance. This is the second aspect of the application of the latecomer's advantage in the field of environmental problems. The environmental burden resulting from industrialization in latecomer countries differs from the advanced countries, and the degree of the burden is less in the latecomer countries than in advanced countries. A representative factor to realize this trend is the transfer of environmental technology and funds to be used for measures to protect environment from developed countries to developing countries.

3.2 Integration into the world environmental market and latecomer's advantage

In this section, the changes in the environmental burden between China and India and more developed countries will be analyzed to illustrate the effect of integration into the world environmental market⁽¹⁶⁾. China and India are used for this analysis because their integration into the market was confirmed in the previous section. Because of limitations of space, only preliminary analyses are described here.

Many indicators are useful to measure the environmental burden, but the growth rate of GHG emissions is used as an indicator in this paper. Usually, GHG emissions per capita are used for analyses. However, the cause of the global warming is not the GHG emission itself but its concentration level in the air. Therefore, the total GHG emission level by country, instead of the GHG emission per capita, should be used in this analysis. The growth rate of GHG emissions is also adequate for this analysis because this paper is not analyzing the absolute value of the GHG emissions, but its changing rates. The level of CO₂ emissions is another good indicator to measure the environmental burden. Many countries have good CO₂ data, which makes it possible to grasp the long-term trend. However, the level of contribution of CO₂ to the reduction performance among the CDM project is not

very high (Hino, 2007b). Therefore, the level of GHG emissions is used as an indicator in this paper to measure the environmental burden.

Comparable data of GHG emissions are only available for 1990, 1995, 2000, and 2005. This paper therefore presents a comparison of growth rates of environmental burdens in India and China between 2000 and 2005, during which their integration into the world environmental market was confirmed, and those of the countries that were at the similar economic level with India and China at that time, between 1990 and 1995. It is noteworthy that the CDM project became active only after 2005, when the Kyoto protocol was issued. Therefore, the robustness of this analysis is limited. For convenience, 2000 for latecomer countries and 1990 for advanced countries are called the first term, and 2005 for the former and 1995 for the latter are called the second term.

The classification of advanced and latecomer countries is based on the timing of industrialization (Industrial Revolution). In this paper, industrialization is considered as leading to improved income level per capita; thus, the countries where improved income level per capita was achieved earlier are considered advanced countries. Based on the income level per capita and growth rate of the income level per capita of China and India during 2000–2005, those figures of Thailand and Indonesia during 1990–1995 were projected. Thailand and Indonesia were chosen for comparison as countries with similar economic development levels with those of China and India during

1990–1995 (Table 2).

Thailand and Indonesia were known as the “East Asian miracle” for their rapid economic growth since the late 1980s. They were the key countries for global economic growth in the late 1980s. On the other hand, China and India, as is widely known, have been the key players in global economic growth since the late 1990s.

Figure 3 presents trends of environmental burdens of advanced countries and latecomers. The environmental burden of the first phase is set at 100. In India, the differences in the growth rates of environmental burden from the advanced countries were observed, but in China, they were not observed for several reasons. First, the projects in China at the initial stage of CDM were very few. The average annual reduction amount of China as of December 2005 was only 1/4 that of India and 1/3 that of Brazil^(*). The second reason is associated with the measurement of the level of economic development. This issue is also applicable to India; but particularly to China, where the economic disparity between coastal and rural areas is large. Therefore, the income level per capita inadequately reflects the economic development level of the coastal areas, which are the main areas creating the environmental burden.

If China, which is strongly influenced by the country's special factor, is excluded from analyses, the sample size is extremely limited. Despite this limitation, the analysis revealed a difference in the trends of the environmental burden between the advanced and the latecomer countries.

Table 2 Economic status of advanced countries and latecomer countries from the first phase to the second phase (US dollars, %)

	Average income level per capita	Average growth rate of income level per capita
China	3114	8.67
Thailand	3847.5	7.83
India	1812.3	5
Indonesia	1878.8	6.33

Note) The income level per capita is converted by purchase power parity.

Source) World Bank, developed from World Development Indicator

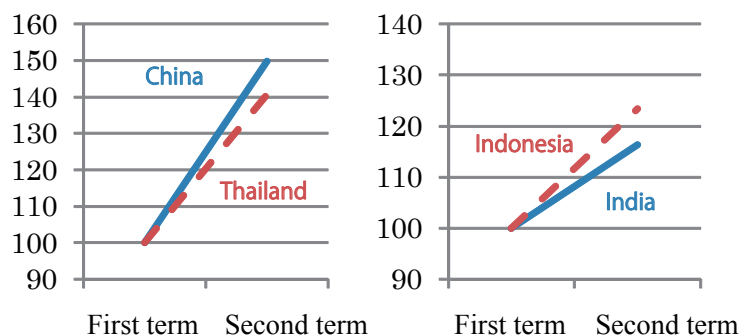


Fig. 3 Trends of environmental burden of advanced countries and latecomer countries (%).

Source) World Resources Institute, developed using Climate Analysis Indicators Tool (ver.6.0)

4. Conclusion

This section summarizes the analyses described in this paper and presents a discussion of future issues.

The essence of the world environmental market for dealing with global warming issues—which was created through public intervention—is to enable sourcing and production of resources as a place for GHG emissions. The sourcing of resources as a place for GHG emissions maintains existing production activities. This is similar to the export of pollution, except for some spatial differences. However, the world environmental market also provides incentives to produce resources as a place for GHG emissions. In this sense, the market provides an effect of changing existing production activities. Consequently, the multiple effects of the world environmental market are to maintain production activities of corporations aspiring to obtain resources as a place for GHG as well as to change the production activities of developing countries in which such production occurs.

International sourcing of resources in the past in many cases was targeted at developing countries, forcing them to bear the burden. With the classic resource problems, which comprised resource consumption and resource production activities, the world structure specific to that time period imposed a disadvantageous exchange on developing countries. With these issues, the key products were primary products. With the export of pollution, the spatial exchange of the existing production sites made it possible to obtain resources. However, the production activities of the targeted resources did not take place in this international sourcing. With the world environmental market, the developing countries, using the institution of assuring free economic activities, take a role of producing resources as a place for GHG emission. In return, developing countries can receive environment technology as well as funds to take measures to protect the environment. Therefore, they obtain an opportunity to achieve discontinuous improvement of environmental performance as well as achieving sustainable development. Having said so, few developing countries can be integrated into the world environmental market as of now. A new institution should be developed for least developed countries (LDC), and a supporting system to facilitate integration of LDC should be explored. The additional investment costs to transfer all developing countries to low carbon economies are estimated as 25–50 billion dollars (Watson, 2007). The CDM dealing amount is 32.4 billion dollars, as described above. Furthermore, not all are used in developing countries.

Two points are noteworthy as future issues. First, factors that contribute to difference in environmental performance between the latecomers and advanced countries should be examined further. The advantage of the latecomers was confirmed from the trend of the GHG emission levels. There were implications that this was achieved through the effect of integration into the world environmental market. However, no rigorous verification of it has been conducted yet. The possibility remains that the change in the trend resulted from the transfer of environment technology or funds that are unrelated to CDM. The “latecomer’s advantage” was achieved through

institutional factors that were not suggested by this paper if that is the case. Second, policy recommendations should be made with respect to the specific institutional design of the world environmental market. It is an important task to explore the system to facilitate integration of developing countries, including LDCs, into the world environmental market.

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(Endnotes)

- (*1) As UNDP (2007) suggests, not only mitigation issues but also adaptation issues are serious and important.
- (*2) See Hino (2005, 2007a) for the details of EG&S negotiation.
- (*3) International economic activities were aspired not only to solve resource issues but as ways to promote sales of surplus products. To clarify the discussion points, this point is not included in the discussion of this paper.
- (*4) See for example, Jones (2005, chapter 3).
- (*5) Marshall (1920) argued that consumption is "the destruction of the basic elements that provide utility to the consumers".
- (*6) See Taylor (2006) for the characteristics and arrangement of the various models of "Pollution Haven Hypothesis".
- (*7) See for example, Tobey (1990).
- (*8) In the Malaysia ARE case, the company did not adequately process thorium in the facility and left it out in open spaces.
- (*9) Taylor (2006) argues that the "pollution haven effect" cannot be denied, even if the pollution haven hypothesis cannot be supported. The pollution haven effect is a prerequisite for the pollution haven hypothesis. The hypothesis can be established if the effect is strong.
- (*10) For example, in the 1970s, a mercury poisoning case took place in Canada. This was caused by Lead International, a British multinational corporation.
- (*11) Other markets related to environmental include 1) the market of goods needed for environmental measures, and 2) the markets of goods and services that embody the comparatively superior environmental technology. These markets are different from the "world environmental market" created by public intervention. They emerge naturally from economic activities in the private sector. They can be called the "environmental business market".
- (*12) See Hino (2007b) for the utilization requirement of the CDM project for the Annex I countries.
- (*13) According to Gerschenkron (1962), the importance of the borrowed technology was repeatedly and accurately emphasized by Veblen.
- (*14) Hayami (2001) valued this point as an important contribution by Gerschenkron (1962).
- (*15) "Diversity of environmental problems" captures the fact that pollution problems, pollution export problems, cross-border pollution problems, global environmental problem, and universal environmental problem are emerging in the modern global economy.
- (*16) Brazil performed well as a country to accept CDM. However, during 2000–2005, it showed high income per capita, although its growth rate was low. Because of this special character, no country exists that was applicable to compare the economic condition. Therefore, Brazil was not included in these analyses.
- (*17) It was computed based on the CDM Project data analysis by the Institute for Global Environmental Strategies (IGES) (http://www.iges.or.jp/jp/cdm/report_cdm.html).