

Strategy to Develop Frontier Markets with Emphasis on Adaptation to Climate Change

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Climate change not only affects the global environment, as seen in the changes in ecosystems and poor harvests that are caused by temperature rise, changes in rainfall patterns that lead to unseasonable droughts and heavy rains, and spread of salt damage caused by rises in the sea level, but it also has a major impact on society and the economy. Any response to these challenges will require the increased use of not only public, but also private funds.

For private-sector enterprises in developed countries, business opportunities presented by adaptive measures in response to climate change are found extensively in various sectors. For business operated in emerging and developing countries, an approach that takes in not only consumer markets but also local governments and local companies is essential to expanding the scale of business and stabilizing earnings. From this point of view, it is possible to say that adaptive measures in response to climate change will come to form a major market in the future.

Efforts to deal with adaptation business have also begun in Japan under the umbrella of the “2012 Study on Sustainable Contribution by the Japanese Private Sector to Developing Countries’ Adaptation Needs,” which is the feasibility study (FS) project undertaken by Japan’s Ministry of Economy, Trade and Industry. Specific examples include a desert greening system, climate adaptive agriculture in salt-polluted areas and landslide prevention/mitigation business.

An approach adopted for developing frontier markets with an emphasis on climate change should consist of six steps, namely, ① survey of trends in frontier markets by assuming solutions of social issues, ② analysis of a company’s strengths and weaknesses after breaking down business models and product specifications into elements, ③ rebuilding business models based on solutions, ④ alliances with diverse partners, ⑤ rapid establishment of a PDCA (plan – do – check – act) cycle and success models and ⑥ proactively publicizing results and effects.

I Effects of Accelerating Climate Change and Frontier Markets for Private-Sector Enterprises in Developed Countries

1 Effects of accelerating climate change and required adaptive measures

The widespread burning of fossil fuels such as coal and oil has led to increased concentrations of carbon dioxide in the atmosphere, which, in turn, has accelerated climate change. This man-made climate change not only affects the global environment, as seen in the changes in ecosystems and poor harvests that are caused by temperature rise, changes in rainfall patterns that lead to unseasonable droughts and heavy rains and the spread of salt damage arising from rises in the sea level, but it also has a major impact on society and the economy. Developing countries, particularly those in Africa, where the reliance on primary industry is high and where the infrastructure is poorly developed, are particularly vulnerable to the climate change that is caused by global warming.

A fundamental solution to climate change would be to reduce the emissions of carbon dioxide that are the cause of global warming, and so suppress any change. However, for those emerging and developing countries that are vulnerable to climate change, rather than applying such a radical solution, it would be more vital to fully “adapt” to those changes that have already occurred and take necessary measures for adaptation in order to protect human life and stabilize the economy and society.

Most people would agree that the responsibility for supporting emerging and developing countries as they adapt to climate change should fall on the shoulders of those developed countries that have continuously discharged large amounts of carbon dioxide as a result of their past industrialization and current economic

development. In the support provided from developed countries, support from private-sector enterprises, in addition to that coming from the governments of those countries, would have a significant meaning.

This is because, first, the governments of many developed countries are facing financial crises, and as such are finding it difficult to continue to increase the amount of tax-funded direct aid that they provide. However, if private-sector enterprises were to approach these activities as business opportunities and if such business reaches a profitability milestone, governments could be relieved of the financial burden and support could continue to be offered through business activities by the private sector.

Second, private-sector enterprises in developed countries possess a variety of technology and expertise that can be effectively used for adaptation to climate change. The development of business related to adaptation to climate change by transferring such technology and expertise to emerging and developing countries will enable those countries to establish a sound economic base and will lead to the development of their economies.

Given this background, this paper focuses on adaptation business by private-sector companies that is related to climate change caused by global warming.

In this paper, adaptation business is defined as “corporate activities to operate business in the fields of adaptation to climate change by regarding social problems that have arisen (or are highly likely to arise) as a result of climate change in emerging and developing countries as business opportunities for Japanese companies.” Therefore, in this paper, businesses that are classified as engaged in corporate social responsibility (CSR) activities and those that are designed to provide aid to emerging and developing countries are not included in the term “adaptation business.”

2 Frontier markets for private-sector enterprises in developed countries

For Japanese private-sector companies, business opportunities related to climate change have presented themselves in many different areas, as listed in Table 1.

Table 1. Fields of adaptation to climate change where private-sector enterprises in developed countries have strengths and examples of adaptive measures

Fields of adaptation	Examples of adaptive measures
Agriculture, forestry and fisheries	Increasing yields in crop production and revenue, promoting agriculture with a lower environmental load and developing highly climate change-resilient crops
Water	Supplying safe drinking water, and addressing water shortages
Forest	Dealing with and preventing desertification
Health	Preventing the spread of infectious diseases caused by climate change and providing medical treatment
Energy	Improving access to renewable energy
Disaster preparedness	Building society highly resilient to natural disasters such as flood and drought
Education	Providing education in adapting to climate change

For example, Africa is particularly susceptible to climate change. By 2020, it is predicted that a maximum of 250 million people in Africa will face a serious shortage of water, and water-dependent agricultural production will drop by as much as 50 percent. Water purification technologies are a specialty of Japanese companies, which can provide the technologies needed for agriculture to make the most efficient use of limited amounts of rainwater. In addition, given the expertise that they have accumulated through post-earthquake reconstruction and similar situations, Japanese companies possess the technologies and expertise to build an infrastructure that is resilient to natural disasters caused by climate change. Thus, the business opportunities presented by climate change span a wide range of fields, which often can be seen in those business areas in which Japanese companies have a technical advantage.

In the future, as the effects of climate change increase, funding by governments and international organizations will continue to be directed toward adaptation efforts. In addition, if climate change manifests itself as a risk that a company must address, the company has no choice other than paying the cost for necessary countermeasures. In fact, food manufacturers have already been considerably affected by climate change in terms of procuring raw materials. Food manufacturers that had previously kept their costs down by carefully selecting their suppliers have inevitably seen their costs rise through their efforts to reduce the raw material procurement risks associated with natural disasters caused by climate change, and are now procuring their raw materials from suppliers from all over the world.

In doing business in emerging and developing countries, in order to expand the scale of business and stabilize earnings, it is essential to approach the governments and local companies of these countries in addition to their consumer markets. From this perspective, the need faced by the governments and local companies of emerging and developing countries to adapt to climate change will present an enormous business opportunity for Japanese companies in the future.

The Great East Japan Earthquake of March 11, 2011, dealt a huge blow to Japan, while the scale of the earthquake and subsequent tsunami reminded the people of the world of the possible enormity of natural disasters. The efforts that Japan has been making for reconstruction in the wake of the disaster are now attracting the attention of many throughout the world. Therefore, if Japanese companies can provide innovative solutions in a way that showcases their strengths in the fields of adaptation, the presence of Japanese companies would markedly increase. “Strong Japanese companies” support a “strong Japan.” In order to realize such a structure once again, Japanese companies must promote their adaptation business in advance of other countries’ enterprises.

II Wave of Adaptation Business Spreads among Enterprises in Europe, the U.S. and Emerging Countries

1 Proactive efforts by companies in Europe, the U.S. and emerging countries

Companies in Europe, the U.S. and emerging countries have also begun to make proactive efforts for adaptation business. Unlike other businesses, how to address climate change is an essential issue for the growth of companies in emerging countries. This is the reason why not only European and U.S. companies but also major companies in emerging countries have all begun to participate in this field. However, these efforts have only just begun, such that business strategy and methods for business development have not yet been established.

For that reason, this paper will provide an overview of adaptation business by introducing the proactive efforts of companies in Europe, the U.S. and emerging countries as well as the business advantages that they are attempting to gain.

2 Business advantages to be brought about by adaptation business differ by company

As listed in Table 2, the business advantages to companies to be brought about by adaptation business related to climate change consist of those from the following three perspectives.

- ① Reducing business risk by strengthening a company’s supply chain
- ② Building competitive advantage by strengthening a company’s supply chain
- ③ Acquiring new customers

(1) Reducing business risk by strengthening a company’s supply chain

This advantage relates to a company’s efforts to reduce assumed business risks by strengthening its supply chain in advance if damage through the effects of climate change is assumed to be inflicted on the company’s supply chain.

A typical example of these efforts can be seen in the “Sustainable Tree Crops Program,” which addressed the supply chain for cacao beans and which was implemented in cooperation between Mars, a leading U.S. food manufacturer, and the United States Agency for International Development (USAID). In the mid-1990s, cacao bean plantations in northeastern Brazil, from which Mars procured most of the raw material for its chocolate, experienced damage caused by climate change,

Table 2. Business advantages to be brought about by adaptation business, and examples of specific activities and companies conducting such business

Business advantages to be brought about by adaptation business	Examples of specific activities	Examples of companies engaged in adaptation business
(1) Reducing business risks by strengthening a company's supply chain	Establishing a stable material procurement route	Mars (U.S.)
(2) Building competitive advantages by strengthening a company's supply chain	Developing and providing high value-added products by promoting sustainable agriculture	SEKEM (Egypt)
(3) Acquiring new customers	Efficiently using and proliferating resources that are currently being depleted and providing new methods of use	Jain Irrigation Systems (India)
	Reducing damage caused by climate change and creating a sustainable environment	BASF (Germany)
	Collecting, analyzing and providing information to avert damage caused by climate change	Nokia (Finland), Schneider Electric (France), Ericsson (Sweden), Microsoft (U.S.), Allianz (Germany)
	Compensating for damage caused by climate change and establishing a sustainable lifestyle	Safaricom (Kenya), Swiss Re (Switzerland), Tata Consultancy Services (India)

leading to a rapid 25-percent drop in the company's chocolate production. To deal with this situation, starting around 1998, Mars began to develop cacao bean plantations elsewhere in the world in an effort to assure a stable supply of cacao beans, which are essential to the company's core business. This program aimed at achieving the following goals.

- Developing measures to improve ecosystems to those suitable for the production of cacao beans
- Providing training programs on the appropriate methods of cultivating cacao beans
- Assuring a stable supply of good-quality cacao beans to meet the demand for chocolate and chocolate products
- Improving the living standards of small-scale cacao farmers

Through this program, Mars dispersed the cacao bean plantations that provide its raw materials around the world, which led to reducing its business risk.

(2) Building competitive advantage by strengthening a company's supply chain

This advantage involves not only reducing business risks presented by climate change by means of strengthening the supply chain, as described in Item (1) above, but also moving on to develop new high value-added products.

A representative example of this approach is seen in the case of SEKEM, a major Egyptian organic food manufacturer. SEKEM operates farms using a biodynamic agricultural method, which is a type of organic farming, and sells the produce from those farms to supermarkets and stores that sell organic products both domestically and internationally. With this style of farming, the soil is protected and its water retention capacity is increased, resulting in reduced water consumption and increased resource efficiency. In addition, because the consumption of organic vegetables increases

people's immunity, they will be better able to protect themselves from the effects of infectious diseases that can arise as a result of climate change. A rapid increase in the demand for organic vegetables has already been seen in Asia. Emerging and developing countries are generally following the trend towards increasing demand for organic produce along with the growth of economy. In light of this situation, it can be said that SEKEM's farming methods not only constitute excellent adaptation but also present good practices that create high value-added products.

(3) Acquiring new customers

This advantage refers to the development of new businesses in the areas of adaptation to attract new customers in the form of international organizations, local governments, local companies and consumers. While such businesses could be diverse, at the current stage, many companies are conducting business in one or more of the following four categories.

- ① Efficiently utilizing and proliferating resources that are currently being depleted, while offering new ways of use
- ② Reducing damage caused by climate change and creating a sustainable environment
- ③ Collecting, analyzing and providing information in order to avert damage caused by climate change
- ④ Compensating for damage caused by climate change and establishing a sustainable lifestyle

① Efficiently utilizing and proliferating resources that are currently being depleted, while offering new ways of use

This is a solution business that proposes, to customers, a means of efficiently using and even proliferating the absolute quantity of resources that are currently being depleted such as food and water, as well as suggesting the use of alternative resources.

For example, Jain Irrigation Systems, a major Indian manufacturer of irrigation systems, provides micro-drip irrigation systems to farmers. These systems feature tubes that are laid out across a field, and which allow no more than the barest minimum amount of water to drip out onto the crops. Thanks to these systems, it is possible to produce reasonable crop yields despite only a limited amount of water being available. The use of such systems in areas where sufficient yields are no longer possible due to reduced rainfall that is caused by climate change can lead to an improved quality of life for farmers in the region.

② Reducing damage caused by climate change and creating a sustainable environment

This is a solution where, for example, damage such as salt damage arising from the higher sea levels caused by global warming is suppressed by building infrastructure such as levees and breakwaters along the coast. In addition, a sustainable natural environment is created in places where such infrastructure is constructed. The major German chemical company, BASF, is offering the Elastocoast coastal protection system using super-absorbent polymers as levees. Because super-absorbent polymers hold water, the levee itself becomes a habitat for marine life, allowing an ecosystem to form. In this way, it is possible to prevent damage from being caused by natural disasters, while at the same time protecting the natural environment. It is projected that in the future, the needs of the governments of emerging and developing countries for these solutions that contribute to sustainable development will further increase.

③ Collecting, analyzing and providing information in order to avert damage caused by climate change

This category offers a solution in which weather information as well as information about the spread of infectious diseases are collected and analyzed, and such information is provided to customers such as governments, companies and consumers in order to enable customers to avoid the effects of climate change based on their own decisions. Companies operating in a variety of areas have been offering services in this category.

For example, Finland's Nokia has developed the open-source Nokia Data Gathering research tool that uses the mobile phone network. Rather than using paper, PDAs (personal digital assistants) or laptop computers, this system uses mobile phones that are in common use around the world, and offers solutions in which large amounts of data are collected from every area so that customers can acquire more information that is accurate. In addition, Nokia also offers Nokia Life Tools whereby information is provided through mobile phones. This service provides an information platform that incorporates multiple information services, one of which is Nokia Life Tools agricultural

service, which provides information related to climate change.

This service provides daily weather reports, news and advice on agriculture, and listings of trading prices of crops in neighboring markets. Farmers in emerging and developing countries have relied on many years of experience to efficiently cultivate crops. However, in the face of climate change, such experience alone is no longer enough to make accurate decisions. Nokia Life Tools agricultural service provides a solution that can likely help alleviate this situation and contribute to the sustainable improvement of the revenue of farmers.

As the impact of climate change increases, information related to climate change will likely become indispensable for decision making at every level, including government agencies, companies and consumers. In addition to Nokia, information technology (IT) companies such as Schneider of France, Ericsson of Sweden and Microsoft of the U.S., as well as financial institutions such as Allianz of Germany, have all been active in entering this market.

④ Compensating for damage caused by climate change and establishing a sustainable lifestyle

This solution involves not only providing compensation for losses resulting from climate change through insurance, but also contributing to the sustainable improvement of sales and income from customers.

For example, Tata Consultancy Services, India's leading IT service provider, has deployed its "mKRISHI," which is an agriculture-related information platform using the mobile phone network. The mKRISHI information platform connects farmers with food companies, financial institutions and governments. The use of this platform enables farmers to have a point of contact with insurance companies that offer insurance products to guard against the effects of climate change. By taking out insurance against weather-related risks, farmers are able to maintain their lifestyles even if their crops suffer damage because of extreme weather.

Insurance is not the only function of mKRISHI in that it also provides support for the sustainable lifestyles of farmers by combining multiple financial products such as providing a means for farmers to put money aside to draw on if a disaster occurs. Because food companies also subscribe to mKRISHI, they can procure raw materials directly from farmers, thus enhancing the profits of both the food companies and farmers as it eliminates intermediaries. Furthermore, procurement risks for food companies are reduced because they can draw on any of multiple suppliers that subscribe to mKRISHI. Given that the information platform is available for any change occurring in the future, the number of subscribers and the amount of content offered will increase in the future. Therefore, even if damage caused by climate change is diversified, this solution can adapt to such diversification.

As described above, although the number of companies is still limited, some companies in Europe, the U.S. and emerging countries have come to recognize the advantages presented by adaptation business, while some of these companies have actively been pursuing business development. In particular, because “acquiring new customers” is directly linked to expanding business in the markets of emerging and developing countries, the active deployment of adaptation business by Japanese companies is likely.

III Beginning of Adaptation Business by Japanese Companies

1 Support for adaptation business from Japan's Ministry of Economy, Trade and Industry

Nomura Research Institute has been entrusted by Japan's Ministry of Economy, Trade and Industry to undertake the “2012 Study on Sustainable Contribution by the Japanese Private Sector to Developing Countries' Adaptation Needs” (the feasibility study (FS) project).

In recent years, the trend in international negotiations related to climate change has been focusing on “adaptation” measures as they relate to the effects of climate

change in addition to “mitigation” measures (described in Section 3 of this chapter). In light of this trend, the purposes of this FS project included extensively inviting proposals from Japanese companies that are attempting to contribute to adaptive measures to deal with social issues facing developing countries, as well as studying the value, significance and feasibility of such proposals as projects delegated and supported by the government. At the same time, this FS project aimed at expanding adaptation business and increasing the recognition of such business.

With the participation of outside experts, this FS project examined the proposals from the viewpoint of the business continuity and practicability and adopted seven feasibility studies for adaptation business. These feasibility studies are outlined in Table 3.

Given that the field of adaptation is difficult to understand, it is difficult to assume that this business has gained full recognition. Therefore, this paper sets out to explain adaptation business by introducing the seven feasibility studies adopted in this project with the aim of increasing the level of recognition of adaptation business and promoting the development of such business.

2 Latest cases of adaptation business

(1) Toray's desert greening system

As a result of climate change, South Africa is experiencing a serious desertification problem. The increasing

Table 3. Companies whose proposals were adopted in the “2012 Study on Sustainable Contribution by the Japanese Private Sector to Developing Countries' Adaptation Needs” undertaken by the Ministry of Economy, Trade and Industry

Name of representative company	Target country	Outline of project
1. Sharp	Kenya	The feasibility study will be conducted in Kenya for business that provides both solar energy and water purification using electrolysis. This study aims to make sustainable improvements for access to safe water, which has begun to decrease as a result of climate change.
2. Toray	South Africa	The feasibility study will be conducted in South Africa for business that provides erosion control systems, vegetation beds and drip irrigation on a combined basis. This study aims to control the progress of desertification, which has been accelerating as a result of climate change, increase arable land areas and improve agricultural productivity.
3. Yamaha Motor	Cote d'Ivoire, Ghana	The feasibility study will be conducted in Cote d'Ivoire and Ghana for business that provides a simple, compact clean water system using slow sand filtration technology. This study aims to make sustainable improvements for access to safe water, which has begun to decrease as a result of climate change.
4. Ajinomoto	Tanzania	The feasibility study will be conducted in Tanzania for business that provides farmers with fertilizers containing amino acids. This study aims to improve resilience to damage in vegetation arising from factors such as high temperature caused by climate change, as well as to expand the scale of production.
5. Kawasaki Geological Engineering	Vietnam	The feasibility study will be conducted in Vietnam for business that installs instruments for assessing and measuring slope risks related to landslides, builds observation and early evacuation warning systems and undertakes countermeasure construction. This study aims to prevent and mitigate landslide disasters that have been increasing as a result of climate change.
6. Sanyo	Kenya and Somalia	The feasibility study will be conducted in Kenya and Somalia for business that provides solar lanterns using solar power generation technology. This study aims to improve the security of refugees caused by droughts, which are increasing as a result of climate change, and to provide basic social education.
7. Yukiguni Maitake	Bangladesh	The feasibility study will be conducted in Bangladesh for mung bean production business. This study aims to improve the possibility of producing mung beans in salt-polluted areas, which are increasing as a result of climate change, and expand the scale of production.

desertification is robbing the country of arable land areas, making the need to prevent such desertification extremely critical for purposes such as ensuring a stable food supply. This issue is also being faced by other African countries. In response to these needs, Toray is considering the sales of a desert greening system.

This system consists of the following three elements.

- ① “PLA sand tube” (left side of Figure 1) prevents the spread of sand into farmland
- ② “PLA roll planters” (right side of Figure 1) made of a special fiber that has no effect on the environment are used as the basis for vegetation
- ③ Water is stably and efficiently supplied (drip irrigation system)

Agriculture in the desert faces several problems such as seeds being blown by the wind, sand interfering with germination and the inability to ensure stable irrigation. Toray’s desert greening system can resolve these problems. In addition, because both the PLA sand tubes and PLA roll planters are made of a special fiber that is biodegradable, the system is completely harmless to the environment. These features are highly evaluated.

As such, Toray’s desert greening system is very likely to be an effective means of adapting to desertification. If its effect can be demonstrated quantitatively, not only in South Africa but also in other countries that are plagued with desertification, the system will provide a means of enhancing the country’s degree of resilience to climate change.

The PLA sand tube (①) and PLA roll planter (②) solutions were jointly developed by Toray and Mitsukawa. The drip irrigation system (③) was developed by Netafim. Therefore, Toray’s desert greening system was made possible by the interaction of three companies, namely, Toray, Mitsukawa and Netafim.

(2) Yukiguni Maitake’s climate adaptive agriculture in salt-polluted areas

The 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) of the United Nations pointed out that “coastal areas, especially heavily populated megadelta regions in South, East and Southeast Asia, will be at greatest risk due to increased

flooding from the sea and, in some megadeltas, flooding from rivers.” For this reason, those countries with low-lying coastlines very much need solutions for avoiding salt damage as well as for farming methods that can be used to cultivate salt-polluted land.

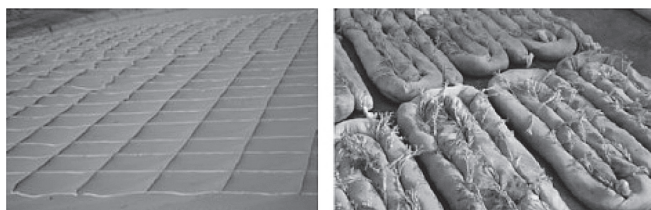
Bangladesh is no exception to this phenomenon, with the salt-polluted area along its south coast increasing by 26.7 percent in 36 years, from about 833,000 hectares in 1973 to about 1,056,000 hectares in 2009 (M. Jahiruddin and M. A. Satter, “Agricultural Research Priority: Vision - 2030 and beyond,” Bangladesh Agricultural Research Council Farmgate, Bangladesh Agricultural University, March 2010). As such, developing a means of adapting to this salt damage is a pressing issue for the Bangladesh government.

Under such circumstances, Yukiguni Maitake, which has already been cultivating mung beans in Bangladesh, has been investigating the feasibility of cultivating crops in these salt-polluted areas.

Compared to the cultivation of regular farmland, agriculture in salt-polluted areas is subject to many severe constraints. These problems could be solved by the introduction of advanced cultivation management methods and Japanese cultivation technology. However, to do so would require the cooperation of the local government. In this regard, as mentioned above, Yukiguni Maitake already has experience in growing mung beans in Bangladesh, and has signed a memorandum of understanding (MOU) with the Department of Agricultural Extension (DAE), a local government agency, concerning the cultivation of mung beans in salt-polluted areas. The company has also introduced an agricultural data management system using information and communications technology (ICT). As a result of these efforts, the local government also came to expect some yields even in salt-polluted areas. In consideration of that situation, Yukiguni Maitake’s mung bean production in salt-polluted areas in Bangladesh was adopted as one of the projects for which feasibility studies are conducted under this FS project.

If the feasibility of cultivation in salt-polluted areas could be verified through this FS project, it would prove that Japanese companies have the means through adaptation business to contribute to the countries and regions that are suffering from salt damage as a result of climate change.

Figure 1 “PLA sand tube” (left side) and “PLA roll planter” (right side)



Source: Material published by Toray.

(3) Kawasaki Geological Engineering's landslide prevention/mitigation business

In addition to agriculture, mentioned above, disaster prevention/mitigation is another area that holds great promise as an adaptation business.

In step with Vietnam's economic growth, the country's government has formulated many development plans such as the North-South Expressway and the North-South Express Railway. However, partly due to the effects of climate change, Vietnam has been experiencing a greater number of storms and increased frequency of torrential rainfall, such that natural disasters such as landslides and mudslides have become more serious and more frequent. For this reason, measures for preventing landslides are essential to the construction of the expressway and express railway, both of which are fundamental to the country's development. With the government announcing the "National Strategy for Natural Disaster Prevention," Vietnam is placing more and more emphasis on disaster prevention. As such, the country is assumed to have considerable need for landslide prevention/mitigation.

According to research by Kawasaki Geological Engineering, which installs instruments for assessing and measuring slope risks related to landslides, builds observation and early evacuation warning systems and undertakes countermeasure construction, the Vietnamese government has no specific standards or guidelines in place for disaster preparedness and has become interested in the standards and guidelines adopted by Japan. Kawasaki Geological Engineering's disaster prevention/mitigation business is involved in the vital issue of how to adapt to torrential rain while continuing economic activities without interruption. If Kawasaki Geological Engineering's disaster prevention/mitigation business gains increased recognition through this FS project, the result will show the spread of Japan's adaptation business.

In addition to the deployment of Kawasaki Geological Engineering's disaster prevention/mitigation business to Vietnam and its neighboring countries, it will become possible to export Japan's standards and disaster prevention/mitigation technology as a package in the form of de facto standards for disaster prevention/mitigation. This is another noteworthy possibility.

3 Towards the expansion of adaptation business

(1) Global fundraising

Japanese companies that are considering making a move into adaptation business should use the support programs offered by countries or international organizations such as this FS project. Throughout the world, many funds and grants are available for adaptation business. This is very apparent from the "Climate Finance Options" website, which is an information platform jointly

operated by the United Nations Development Program (UNDP) and the World Bank (<http://www.climatefinanceoptions.org/cfo/>).

This platform not only provides information on funding related to climate change but also is designed to share best practices. The platform is accessible to anyone, and searches can be done by specifying diverse conditions according to the purpose, such as by region, by sector and by means of funding. For example, searching for "Adaptation" and "Grant" returns 30 funding sources including the "Climate Change Fund (CCF)" offered by the Asian Development Bank (ADB), which targets the Asian region (Table 4; as of January 30, 2013).

(2) Continuous support from the government

In order to expand adaptation business, besides financing schemes (planned frameworks), human networks also need to be expanded. Because adaptation business has only a brief history, a company deploying such business should aim to exchange information on a regular basis not only with companies operating this business but also with the persons in charge at related international organizations.

Therefore, this FS project set up a study group as the venue where companies whose proposals were adopted for the implementation of feasibility studies under this project can report on the progress of their respective feasibility studies and discuss the issues facing them. The study group is composed of the representatives of international organizations and international financial institutions as well as university professors. As such, for companies conducting adopted FS projects, the study group provides a valuable opportunity to expand their human networks.

The creation of such human networks does not have to be limited to "adaptation" measures for dealing with the adverse effects of global warming. The door should be open to all organizations involved in business related to climate change including those engaged in "mitigation" measures for halting the progress of global warming as well as in the reduction of greenhouse gas emissions through reforestation as promoted by the United Nations Collaborative Program on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD).

The funding sources listed on the Climate Finance Options website, which was explained in Item (1) above, do not limit the themes of qualifying projects to "adaptation," but generally extend such themes to include "mitigation" and "climate resilience."

In order to broaden the range of adaptation business in the future, it is essential to create a foundation based on which such business can be developed and can take root. Therefore, government ministries and agencies including the Ministry of Economy, Trade and Industry are expected to provide opportunities such as this FS project on a continuous basis.

Table 4. Examples of funding sources related to adaptation business that are listed on the “Climate Finance Options” website

Region	Search results (number of funding sources)	Examples of funding sources	Outline
Asia	3	ADB Climate Change Fund (CCF)	In May 2008, the Asian Development Bank (ADB) established the CCF to facilitate greater investments in ADB’s developing member countries (DMCs) to effectively address the causes and consequences of climate change. For example, the CCF has provided funds for a project in Bangladesh.
		NEFCO Carbon Finance and Funds	The Nordic Environment Finance Corporation (NEFCO) provides support for projects that are in line with various requirements such as those of the Kyoto Protocol. The NEFCO projects include a hydropower project in Vietnam.
Africa	5	ClimDev-Africa Special Fund (CDSF)	The CDSF is a joint initiative of the African Development Bank (AfDB), the African Union Commission (AUC) and the United Nations Economic Commission for Africa (UNECA). Support is provided for projects such as the generation and wide dissemination of reliable and high quality climate information in Africa.
		MDB Pilot Program for Climate Resilience (PPCR)	The PPCR is designed to pilot and demonstrate approaches for integration of climate risk and resilience into developing policies and planning. Grants and loans are provided to the countries and regions that the Multilateral Development Bank (MDB) considers eligible (in Africa, eligible countries include Niger and Mozambique).
Others	22	Global Climate Change Alliance (GCCA)	The GCCA provides support to low-income countries such as small island developing states (SIDS) and least developed countries (LDCs). The project examples include mainstreaming climate change adaptation and disaster risk reduction in Vanuatu.
		Climate and Development Knowledge Network (CDKN)	The CDKN is a cooperative project catalyzed by the governments of the Netherlands and the United Kingdom. Applications can be made for all sectors including agriculture and power generation. Qualifying projects are those whose themes are related to the environment such as “adaptation,” “mitigation” and “low-carbon.”

IV Steps to Develop Frontier Markets with Attention Placed on Climate Change

Up to this point, this paper has introduced the features of frontier markets with attention placed on climate change, the pioneering activities of companies in Europe, the U.S. and emerging countries to develop these markets and the efforts of the Japanese public and private sectors that have become active in recent years.

This chapter presents the steps that should be taken to develop these markets. These steps have been identified through an analysis of many examples of successes and failures. As shown in Figure 2, there are six steps. While the names assigned to each step are nothing new, specific activities at each step feature elements that are particular to frontier markets.

1 Survey of trends in frontier markets by assuming solutions of social issues

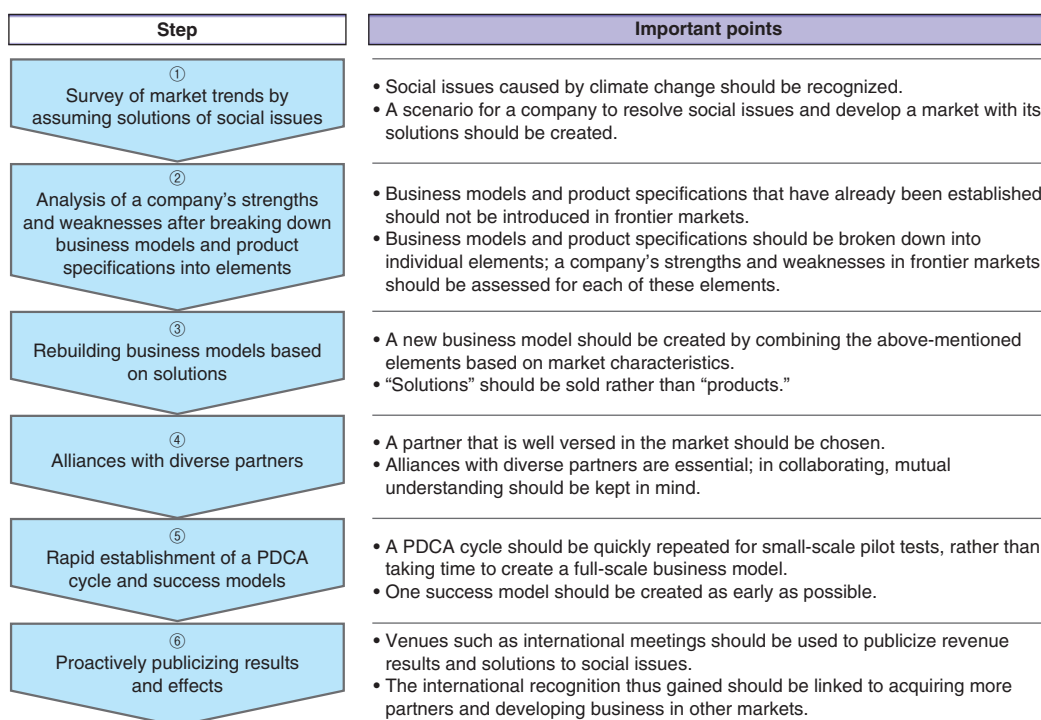
In conducting a survey of frontier markets that are generally susceptible to the effects of climate change, attention must also be paid to “social issues” that are presented by these markets in addition to the normal survey of commercial needs and market trends. As explained in the previous chapters, climate change has a variety of effects on people’s health and their

household finances. Therefore, the businesses and products that are operated in and offered for frontier markets must be those that contribute to the solution and/or alleviation of those social issues. It is important that such contribution can result in the development of frontier markets.

Therefore, when conducting a survey of trends in frontier markets, in addition to identifying the “current status” of a target market and predicting a “trend-based future scenario,” a “scenario that is predicted when a company develops the market with its solutions” should also be created. If the standard of living in the target market is improved through the resolution of social issues, and a self-propelling development cycle starts, the market can exhibit a growth rate that is in excess of that was originally expected.

For example, Panasonic (Sanyo Electric) has been implementing a demonstration project to provide solar lanterns to refugees in East Africa, whose numbers have increased as a result of drought. The point of this project is not to create a revenue stream by selling products to refugees, but rather to pursue a long-term goal of promoting resolution of the refugee problem and, only after their standard of living is improved, selling the company’s products to them.

In conducting a survey of trends in frontier markets, the business feasibility should be studied by assuming the future scale of the market after considering the effects of development that are to be brought about by the company’s solutions.

Figure 2. Steps to develop frontier markets with an emphasis on climate change

Note: PDCA = Plan, Do, Check and Act.

2 Analysis of strengths and weaknesses of a company's businesses and products after breaking down business models and product specifications into elements

A company should analyze the strengths and weaknesses of its businesses and products as they relate to frontier markets. However, rather than simply applying business models and product specifications that have already been established in other markets to frontier markets, business models and product features should first be broken down into individual elements, and then the strengths and weaknesses of the businesses and products in the frontier markets should be assessed for each element. Compared to developed countries and rapidly growing emerging countries, frontier markets present a variety of constraints and differences, making it difficult to unconditionally apply existing business models. Therefore, the selection of elements should be made by understanding which elements would be suitable for a target market and which would not.

3 Rebuilding business models based on solutions

A business model should be rebuilt to suit frontier markets by combining the elements that constitute a company's strengths in these markets, while eliminating any elements that are unnecessary. In building a new business model, rather than taking a hardware-based approach that addresses product specifications, it is important to devise a software-based approach that

considers how products are used and sold. "Solutions" rather than "products" should be sold by identifying what users can do with a product as well as what issues are to be resolved. For example, in Kenya, Sharp is considering setting up a business that uses its solar panels to power a water purification system using electrolysis. In this case, it is better to think of offering a "means of acquiring clean water," rather than "solar panels."

4 Alliances with diverse partners

In order to operate business in a frontier market, it is essential to cooperate with a partner that is well versed in the target market. When considering candidate partners, in addition to private-sector companies, it is also possible to work with other players that are active in the market, including local governments and international organizations, as well as non-governmental organizations (NGOs) and non-profit organizations (NPOs). In fact, leading companies are all joining forces with partners they consider most suitable.

When selecting a partner, the first and most important point is the perspective of "market understanding and market penetration." In a frontier market where distribution channels and mass media have not yet been established, the key to approaching consumers is to what extent a company is close to the market. A Japanese company intending to enter a new market needs to work with a partner that has already been in the market for many years, such that it has an excellent understanding of the market and has successfully penetrated that market.

The second point concerns the perspective of “understanding the business.” Among the players that are in close contact with the market, there are many whose main purpose is other than making a profit. If a company works with such an organization, on the part of the partner, some degree of understanding is necessary for the company’s business, which is conducted for the purpose of making a profit. On the part of the company, it is necessary to understand and respect the fact that the partner’s fundamental purpose is other than generating a profit. Consideration should be given to a cooperative method whereby both parties can fulfill their respective roles and consequently both sides can contribute to the market development.

5 Rapid establishment of a PDCA cycle and success models

Unlike the markets of developed countries, frontier markets present an extremely high degree of uncertainty because an industrial structure has not yet been established, making it difficult to expect even the most carefully developed business plan to function effectively. An effective means of operating business in these markets is to quickly repeat a PDCA cycle (Plan – Do – Check – Act) for small-scale pilot tests. Furthermore, rather than the four P, D, C and A steps, it is necessary to reduce these steps to two steps, namely, PD and CA. In addition, a response should be made whenever market information is obtained in the course of doing business. By so doing, it is important to create a success model, no matter how small it is, at as early a stage as possible.

6 Proactively publicizing results and effects

The business should be scaled up by injecting a certain degree of investment into the success model thus created. At this time, it is important to proactively publicize the revenue results and solutions to social issues that have been attained through business efforts.

At meetings sponsored by governments and international organizations, in addition to conventional aid measures, very high interest is also shown in the resolution of social issues through the commercial activities of private-sector companies. Publicizing a company’s business at such venues can bring international recognition to such business, enabling the company to attract new partners and find opportunities to develop its business in the markets of other countries.

Chapter IV introduced effective steps for developing frontier markets with an emphasis on climate change, which have been identified through research and studies that have been done to date. The authors hope that by utilizing and applying these steps according to the circumstances of a company and a target market, more and more Japanese companies will successfully move into frontier markets and that, as a result, it will become possible to solve the social issues caused by climate change in emerging and developing countries.

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