Climate Change Adaptation Good Practices

by Japanese Private Sector in Developing Countries

March 2024

METI
Ministry of Economy, Trade and Industry

This booklet was compiled as part of the Ministry of Economy, Trade and Industry of Japan's "Fiscal Year 2023 Research Project for Environmental Problem Countermeasures by Small and Medium Enterprises (Visualization of Contributions of Japanese Companies in Adaptation Fields in Developing Countries)" by Deloitte Tohmatsu Consulting LLC, the project consultant.

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Introduction

This booklet is presented as part of the "Fiscal Year 2023 Research Project for Environmental Problem Countermeasures by Small and Medium Enterprises (Visualization of Contributions of Japanese Companies in Adaptation Fields in Developing Countries)" by Ministry of Economy, Trade and Industry of Japan.

The global community has been facing more extreme and frequent weather events and natural disasters than in the past, as seen in the torrential rains, record heat and frequent wildfires, and these disasters impacting people's lives and livelihoods, economies, societies, infrastructures and other broad areas in a variety of ways. To address climate change, "measures for adaptation to climate change" are considered important as an approach to reducing the impacts of climate change which are already emerging and to preparing for potential risks, in addition to taking "mitigation measures" as an approach to curbing greenhouse gas emissions.

We believe that, for any country, engagement of the private sector in the climate change adaptation activities is necessary for its sustainable growth, and therefore we have been promoting participation of the private sector to such adaptation activities overseas. This booklet specifically showcases the good practices of Japanese companies' adaptation business in developing countries across a range of fields, including the fruits of support by the Ministry of Economy, Industry and Trade to date.

We hope that this booklet will help grasp image of adaptation businesses and ultimately contribute to the development of new businesses by the companies seeking such opportunity in developing countries.

Lastly, we would like to extend our cordial appreciation to all the companies for their cooperation on development of this booklet.

March 2024

Global Environmental Affairs Office,
Industrial Science and Technology Policy and Environment Bureau,
Ministry of Economy, Trade and Industry of Japan

Explanatory Notes

In this booklet, each good practice is organized into seven promising areas in which the Japanese private companies can make an international contribution in the field of adaptation. Some good practices fall into more than one field. This booklet also describes the Sustainable Development Goals (SDGs) by the United Nations that are closely related to each good practice, as well as how each good practice addresses the challenges of climate change, out of ten issues identified based on the IPCC Sixth Assessment Report.

7 Promising Areas of Adaptation

- Resilient Infrastructure against Natural Disasters
- Sustainable Energy Supply
- Food Security & Strengthening Food Productive Base
- Health & Sanitation
- Climate Monitoring & Early Warning
- Secure Resources & Sustainable Water Supply
- Climate Change Finance

Related SDGs

10 Climate Change Challenges

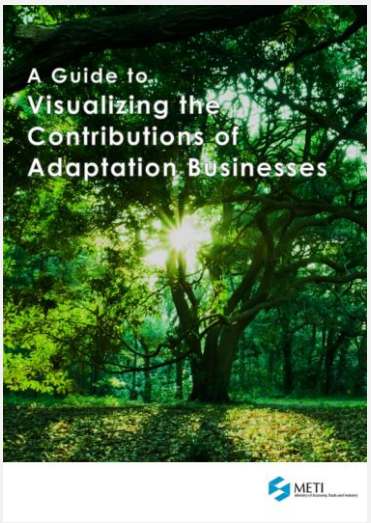
①Sea level rise
②Droughts
③Floods, heavy rain & typhoons
④Extreme temperature changes
⑤Water insecurity
⑥Food insecurity
⑦Air, water & land-based pollution
⑧Spread of infectious diseases
⑨Ecosystem loss
⑩Economic loss & livelihood failure

Column

Trial of visualization of contribution by adaptive business

Introduction

While adaptation businesses are expected to have multifaceted impacts, such as addressing social issues stemming from climate change, their non-economic effects can often be challenging to quantify, leading to their contributions being underappreciated. On the other hand, adaptation strategies were spotlighted as a crucial issue at the 27th Conference of the Parties (COP27) to the United Nations Framework Convention on Climate Change (UNFCCC) in November 2022. They are increasingly being recognized as a pivotal element in the future international framework for climate change mitigation. Therefore, understanding and communicating the contributions of adaptation businesses to external parties like investors can serve as a new point of appeal in their business development strategies.



A Guide to Visualizing the Contributions of Adaptation Businesses

Considering that a standardized rule for visualizing the contributions of adaptation businesses has not yet been established, the Ministry of Economy, Trade and Industry (METI) has developed the "Guide to Visualizing the Contributions of Adaptation Businesses" in the "Fiscal Year 2020 Study on Countermeasures for Issues related to Climate Change (Visualization of Contributions of Japanese Companies in Adaptation Fields in Developing Countries)". This guide aims to assist businesses in examining the impacts of their adaptation businesses and connecting them to further business development. It presents six steps for visualizing contributions, examples of indicators related to the seven fields of adaptation businesses, and examples of visualizing contributions. The guide can be accessed at the URL provided.

Japanese

https://www.meti.go.jp/policy/energy_environment/global_warming/jcm/pdf/a_guide_to_visualizing_contributions_R4_Japnese.pdf

English

https://www.meti.go.jp/policy/energy_environment/global_warming/jcm/pdf/a_guide_to_visualizing_contributions_R4.pdf

Given the growing international importance of adaptation businesses, in the "Fiscal Year 2022 Study on Countermeasures for Issues related to Climate Change (Visualization of Contributions of Japanese Companies in Adaptation Fields in Developing Countries)" by METI, a trial was conducted to visualize the contributions of actual cases listed in the collection of good practice examples using the guide. This was done to improve understanding of adaptation businesses and promote investment. Specifically, four cases were selected from the fields of monitoring and early warning, infrastructure resilience, stable food supply, and stable water supply. Indicators to measure contributions were organized, and the impacts related to quantifiable indicators were clarified. The trial results for each case are presented below.

- eTrust Co., Ltd. (No.7)
  Disaster prevention system through real-time image data distributed by river monitoring cameras
- ECOSYSTEM Inc. (No.8)
  Functional paving materials made from waste roof tiles and bricks to reduce urban flooding and heat island effect
- Routrek Networks Inc. (No.26)
  Cultivation of fruit vegetable crops with optimized application of water and fertilizer using an IoT and AI based autonomous drip irrigation system
- Sunda Technology Global Co. Ltd. (No.54)
  Safe water supply through an automatic "pay-as-you-fetch" fee collection system for hand pumps

eTrust Co., Ltd.（No.7）

Disaster prevention system through real-time image data distributed by river monitoring cameras

Summary

StandGuard, a cloud-based disaster prevention system using eTrust's river monitoring cameras, will provide real-time information on river conditions to residents, etc., to help reduce disaster risks by detecting the risk of flooding and flooding in advance.

Assumed scenario and logic model

The following figure presents a logic model for visualizing the contribution of a project, using a hypothetical case where StandGuard is installed in Santa Rosa city, the Philippines, as an example. Prior to the project's implementation, the scenario assumes that water volume boards installed on the city's riverbanks are used as a guide for determining the need for evacuation. Staff from the city's Disaster Prevention and Countermeasures Bureau are responsible for checking water levels as necessary. Additionally, flood information for certain government-designated watersheds is available on the website of the Philippine Atmospheric, Geophysical and Astronomical Administration (PAGASA). However, there is no requirement to monitor other watersheds or to disclose information at the municipal level.

In contrast, upon the project's implementation, river surveillance cameras will be installed at 20 regular intervals along the river. The city's Disaster Prevention and Countermeasures Bureau will receive video data every 10 minutes and distribute the information to the communities in the 18 towns under its jurisdiction. This will enable the regular provision of information to citizens about river levels and potential flooding.

Input	Output	Outcomes		Indicator *
		short-term outcome	long-term outcome	
Personnel	Construction and operation of a disaster prevention system capable of real-time and constant river monitoring	Strengthening the observation range and frequency of river water levels	Visualization of river disaster risk	Number of observation points per km2 (sites/km2)
Standguard, a cloud-type disaster prevention monitoring system				Frequency of update of observation information ** (times/hour)
auxiliary equipment such as water gauges and anemometers		Strengthening the coverage and frequency of river level and flood information	Establishment of a system to stably provide disaster prevention information on rivers	Number of groups receiving observation information (disaster prevention information sources) (groups) and area population covered by the groups (persons)
budget				Frequency of information dissemination to citizens (times/hour)

* For ease of effect measurement, the index was for short-term outcomes.
** In this case, "observation information" refers to video data on the water level and flooding conditions of rivers.

Logic Model for Visualizing Contribution of eTrust Co., Ltd.

Impact Evaluation

The implementation of StandGuard is projected to increase river observation points by 15, enhance the frequency of information reception and dissemination to six times per hour, extend information reception to 18 towns, and improve information dissemination to approximately 410,000 people.

Indicator	Impact Evaluation *		
	Before implementation of the project	After implementation of the project	
Number of observation points per km2 (sites/km2)	5 sites (1 site/approx. 10km2)	20 sites (1 site/approx. 2.7km2)	installation interval 15 points Up
Frequency of observation updates (times/hour)	irregular	6 times/hour	Per hour 6 times Up
Number of groups receiving observation information (groups)	one organization	18 organizations	18 times
Population of the area covered by each organization (people)	0 people	About 410,000 people	410,000 Up
Frequency of information dissemination to citizens (times/hour)	0 times/hour	6 times/hour (= frequency of update of observation information)	Per hour 6 times Up

* The calculation was made on the basis of the experiment result in the Philippines.

Envisioned impact of eTrust's business

ECOSYSTEM Inc.（No.8）

Functional paving materials made from waste roof tiles and bricks to reduce urban flooding and heat island effect

Summary

In Vietnam, construction demolition waste (CDW), such as roof tiles and bricks, is disposed of as industrial waste in landfills and illegally dumped. Eco-System is considering a project to crush and process CDW for reuse as pavement material for sidewalks. Tiles and bricks are porous and have higher water permeability and water retention properties than conventional pavement materials, contributing to the reduction of urban flooding and the heat island effect.

Assumed scenario and logic model

The following figure presents a logic model visualizing the contribution of a project, using a hypothetical scenario where CDW permeable pavement is implemented on roads throughout Hanoi City, Vietnam. Before the project, local pavements typically use materials such as aggregates and crushed stones, which have low water retention properties. Post-project, the scenario envisages the use of CDW permeable pavement.
Key indicators of contribution include the amount of rainwater runoff reduction and the temperature difference between the road surface and the surrounding area when permeable pavement is used across the city, including pedestrian walkways. Secondary effects encompass the utilization of CDW for pavement and the reduction of CO2 emissions. This reduction is achieved through a decrease in emissions during manufacturing and transportation by substituting materials with CDW, and through CO2 fixation and absorption during material dismantling.
Rainwater runoff control is quantified as the volume of rainfall in Hanoi that flows into ditches and rivers. This is calculated based on the city's annual rainfall (1,539 mm/year as of 2021), the ratio of impervious areas (surfaces that cause rainwater to run off without infiltrating the ground), and the permeability of surface soil.

Input	Output	Outcomes		Indicator *
		short-term outcome	long-term outcome	
Personnel	Roads with Permeability and Water Retention **	Improvement of pavement permeability and water retention	Reduction of urban flooding	Rainwater runoff control of pavement construction roads (mm/year)
Mobacon, an on-board paving material manufacturing plant		decrease in pavement surface temperature	Suppression of the heat island effect	Surface temperature (°C) and temperature difference (°C) from surrounding non-constructed parts
Waste tiles and bricks and other necessary materials	secondary effect	Reduction of discarded tiles and bricks	Utilization of CDW to realize resource recycling	Pavement CDW Utilization Amount (kg)
budget			C O, 2 and Emission Reduction by pavement manufacturing using CDW	Reduction in CO and 2 emissions related to pavement construction per square meter (kg-CO 2 / m2)

* For ease of effect measurement, the index was for short-term outcomes.
** In addition to its water permeability and water retention functions, it is also characterized by its high landscaping quality. However, since it is limited to output related to climate change and the environment, it is omitted from output.

Logic Model for Visualizing Contribution of ECOSYSTEM Inc.

Impact Evaluation

The following impacts are assumed for the indicators set that can be quantitatively evaluated. In the scenario of a ride-in type permeable pavement with a surface layer thickness of 10 cm, it's projected to decrease runoff by approximately 14.3% of the annual precipitation. As a secondary effect, about 282 kg of CDW per pavement area will be effectively utilized, leading to a reduction in CO2 emissions by 12.60 kg.

Indicator	Impact Evaluation *		
	Before implementation of the project	After implementation of the project	
Rainwater runoff control of pavement construction roads (mm/year)	0 mm/year	308 mm/year	About 14.3% of annual rainfall is controlled by runoff.
Pavement CDW Utilization Amount (kg)	0 kg/m2	282 kg/m2	282 kg/m2 Up
CO, 2, Emission reduction (kg-CO), 2 / m2	0 kg-CO2/m2	12.60 kg-CO2/m2	12.60 kg-CO2/m2 Up

* This paper is based on setting conditions and calculation results in the Ministry of Economy, Trade and Industry "feasibility study in the field of climate change adaptation in Fiscal Year 2022."

Envisioned impact of ECOSYSTEM's business

Routrek Networks Inc.（No.26）

Cultivation of fruit vegetable crops with optimized application of water and fertilizer using an IoT and AI based autonomous drip irrigation system

Summary

Routrek Networks' Zero Agri (ZeRo.agri®) is an automated drip irrigation system that utilizes IoT and AI. It enables reduction and optimization of water and fertilizer usage. In addition, AI analyzes environmental data on soil and solar radiation levels and weather forecasts to adjust liquid fertilizer concentration and other parameters on extremely hot days, thereby contributing to improved yield and quality.

Assumed scenario and logic model

The following figure presents a logic model for visualizing the contribution of a project, using a hypothetical scenario where ZeRo.agri® is introduced to a tomato farm in Rang Dong Province, Vietnam. Prior to the project's implementation, farmers are assumed to rely on traditional manual soil cultivation and intuitively determine the quantity of irrigation and fertilization based on their past experiences. This approach can make it challenging to adjust promptly to changing weather conditions, making it difficult to maintain consistent crop yields and quality. Upon the project's implementation, ZeRo.agri® is envisioned to be introduced. Through the automatic control of nutrient solution soil cultivation using IoT and AI, the appropriate amounts of irrigation and fertilizer would be determined and supplied based on data such as soil moisture levels and solar radiation levels.

Input	Output	Outcomes		Indicator *
		short-term outcome	long-term outcome	
Personnel	High-precision irrigation and fertilization management	Improvement of crop quality and yield	stable supply of food	Annual yield per 1000m2 (t / 1000m2 ・ year
Zero-Agri, an autonomous drip irrigation system	Production system using zero agri		improvement in farm income	Annual sales per 1000m2 (JPY/1000m2) ・
Green house and other necessary materials		Reduction of water used	Stable supply of water resources	Water used per 1000m2 (m 3/1000m2・ year)
budget		Reduction of fertilizer used	Reduction of GHG emissions from agriculture	GHG emissions (kg-CO)$_{2}$/, year, *CO $_{2}$ conversion
		Self-activation of agricultural work	Reduction of labor burden (labor-saving)	Hours worked (hours/year)

* For ease of effect measurement, the index was for short-term outcomes.

Logic Model for Visualizing Contribution of Routrek Networks Inc.

Impact Evaluation

For each of the established indicators, the following impacts are anticipated: the introduction of ZeRo.agri® is projected to increase annual yields by approximately 20-30% and boost sales by around 12-21%. Additionally, it is expected to decrease water consumption and agricultural CO2 emissions by approximately 50% each and reduce labor hours by roughly 90%.

Indicator	Impact Evaluation*		
	Before implementation of the project	After implementation of the project	
Annual yield per 1000m2 (t / 1000m2 ・ year	9.3 t /, 1000 m2-year	12.1 t / 1000m2-year	About 30% Up
Annual sales per 1000m2 (yen/1000m2 ・ year)	530,000 yen/1000m2-year	760,000 ~ 830,000 yen/1000m2-year	About 33~45% Up
Amount of water used (m3/1000m2・ year) per 1000m2	900 m 3/1000m2-year	450 m 3/1000m2-year	50% Down
GHG emissions (kg-CO $_{2}$/ year) * converted to CO $_{2}$	72.1 Kg-CO $_{2}$/ Year	36.1 Kg-CO $_{2}$/ Year	50% Down
Hours worked (hours/year)	302 Hours/Year	30 Hours/Year	90% Down

* The calculation was based on the results of introduction cases in Japan, hearing results to tomato farmers in Vietnam (carried out in 2017), and experiment results for tomato farmers of other companies in the same industry in developing countries.

Envisioned impact of Routrek Networks's business

Sunda Technology Global Co. Ltd. (No.54)

Safe water supply through an automatic "pay-as-you-fetch" fee collection system for hand pumps

Summary

Sunda Technology Global will install SUNDA, a pay-as-you-go automatic water well maintenance and fee collection system, in hand-pumped wells to help promote sustainable and safe water use. By installing SUNDA, a pay-as-you-go automatic well water fee collection system, Sunda Technology Global will enable fair and transparent maintenance and management of hand-pumped wells and contribute to the promotion of sustainable and safe well water use.

Assumed scenario and logic model

The following figure presents a logic model for visualizing the contribution of a project, using a hypothetical scenario where SUNDA is installed in hand-pumped wells in Gomba District, Uganda. Prior to the project's implementation, the scenario assumes that 648 hand-pumped wells have been installed in the province. However, many of these wells are not well-maintained due to challenges in continuous fee collection. Damaged wells are often left unrepaired, forcing nearby residents to use water from distant, unsanitary reservoirs. In contrast, after the project's implementation, it's anticipated that SUNDA will be installed in 518 hand-pumped wells where fee collection is challenging. The wells will be continuously maintained via an automatic fee collection system, increasing the number of residents in the vicinity with access to a sustainable water source.

Input	Output	Outcomes		Indicator *
		short-term outcome	long-term outcome	
Personnel	Installation of well with hand pump	Improvement of the number of installed wells with hand pumps and the number of users	Increasing population with access to water from hand pump wells	Number of operating wells with hand pumps (units) and number of users (persons)
Automatic well water charge recovery system "SUNDA"	Construction of an automatic well water usage charge recovery system	Securing a sustainable maintenance system for wells with hand pumps	Dissemination of sustainably usable wells with hand pumps	Recovered annual maintenance cost per unit (UGX/unit/year), annual utilization rate (%)
budget				
	secondary effect	Reducing the incidence of diarrheal diseases through unsanitary water	Reduce deaths from diarrheal diseases	
		Shortening of the time for drawing water by switching to the use of a well with a hand pump near the site	Securing activity and study time to improve income	

* Because of the ease of measuring the effect, the indicator is a short-term for outcome.

Logic Model for Visualizing Contribution of Sunda Technology Global, Co. Ltd.

Impact Evaluation

For each of the established indicators, the following impacts are projected: the introduction of SUNDA is expected to boost both the number of operational hand-pumped wells and the number of users by approximately 63%. The amount recouped in annual maintenance costs per unit is anticipated to increase by about threefold. Furthermore, the annual operation rate per unit is projected to rise by approximately 47%.

Indicator	Impact Evaluation*		
	Before implementation of the project	After implementation of the project	
Number of operating wells with hand pumps (units)	398 units	648 units	About 63% Up
Number of Users of Wells with Hand Pumps	119000 people	194000 people	About 63% Up
Recovered annual maintenance cost per unit (UGX/unit/year)	200,000 UGX/unit-year	600,000 UGX/unit-year	About 300% Up
Annual occupancy rate per unit (%) * 365 working days	50% (182 out of 365 working days)	97% (355 out of 365 working days)	About 47% Up

* The calculations are based on published data from the Ugandan government and results of experiments in Uganda.

Envisioned impact of Sunda Technology Global's business

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Sustainable Development Goals (SDGs)

1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

1. Development of anti-disaster information system for utilizing forestry preservation project

Kanematsu Corporation http://www.kanematsu.co.jp/
Hitachi Ltd. http://www.hitachi.co.jp/

Challenges Addressed | ③ Floods, heavy rain & typhoons, ⑨ Ecosystem loss

Adaptation Challenge Frequent forest fire and decrease in forest area due to climate change such as El Nino have led to deterioration of the function of eco system and rise in disaster risks in Indonesia.

Contribution The eco system recovery through forest conservation projects by Kanematsu reinforces physical response capacity to weather events and mitigate disaster risks. In addition, disaster information system built by Hitachi utilizing a flood simulator called DioVISTA/Flood contributes to minimizing the impact of disasters on human, etc.

Project Detail

■ Background

Country | Indonesia

Kanematsu launched a project in Boalemo Prefecture, Gorontalo Province 2011 to raise profits of local farmers suffering from loss of forests caused by slash and burn farming and thereafter shifting from corn to high-quality cacao farming. In 2015, the project was adopted as the "REDD+ Project using Joint Crediting Mechanism (JCM)" and then the pilot project was materialized, under which initiatives are taken to reduce the greenhouse gas emissions to the targeted 86,000 CO2 ton annually for the entire project. A new value chain was established where cacao beans are produced for export to Japan through agroforestry, contributing to greater adaptability of local producers by raising their income. In 2018, the project was adopted as the "Feasibility Research Project towards Overseas Development of High Quality Infrastructure" by the Ministry of Economy, Trade and Industry of Japan and initiatives were launched for introduction of a flood simulator. By utilizing the flood simulator developed by Hitachi Power Solutions, Ltd., Hitachi, Ltd. will be able to visualize its contribution to flood risk reduction realized by Kanematsu's forest conservation business. It aims to commercialize it with a view to developing it as a mitigation and adaptation cross-cutting business by disaster prevention information system and REDD+ business.

■ Challenges and Responses in Business Expansion

As a result of the survey, it was found that there were few former projects/cases of mitigation and adaptation cross-cutting projects by private companies, and the local government did not have sufficient funds and knowledge necessary for business development. Therefore, using FloodS, a free version of the flood forecasting web service built using DioVISTA/Flood, it is considering a business model to switch to the paid version after proving the usefulness of the system. The company is also aiming to commercialize the system in cooperation with local companies, taking advantage of the trust relationship with local governments that Kanematsu built through the REDD+ project.

■ Key Success Factors

The project is supported by a strong partnership with the local partner Gobel Group having an extensive network with public and private sector stakeholders.

▲Implementing Agroforestry

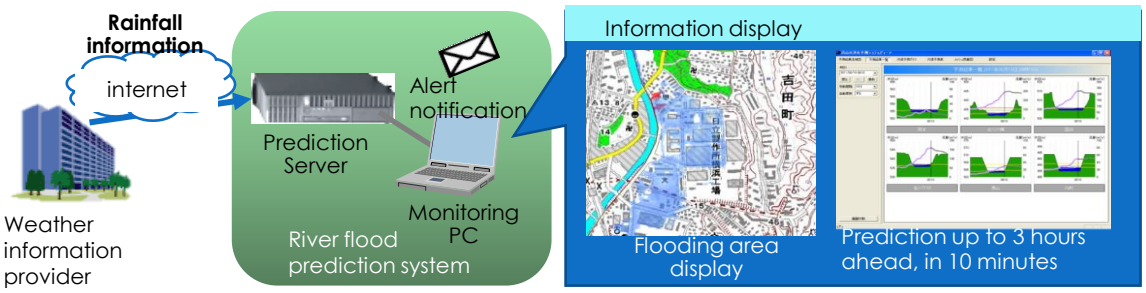
Related SDGs

■ Business Model of the Project

The company is developing its business in cooperation with the Gobel Group, a leading local conglomerate that cooperates in the REDD+ business. The Gobel Group coordinates and manages proposals for disaster prevention information systems to the provincial and prefectural governments of Gorontalo. In addition, Kanematsu has received map data from a map information company with a track record in Indonesia, and also has established a network in Japan and overseas to develop its business, such as partnering with a major chocolate manufacturer in cocoa sales in Japan.

Product & Technology

DioVISTA/Flood: A software developed by Hitachi Power Solutions Co., Ltd. for simulation of floods which is used extensively for prediction of inundation areas by local governments, preparation of flood hazard maps by the central government and prefectures, and quantification of flood risks by insurance companies. The software is equipped with user-friendly functions such as 3-dimention GIS and high-speed simulating calculation functions using the patented technology of Dynamic DDM to enable non-experts to conduct a high level of simulation.



▲DioVista/Flood System Overview

Challenges for Further Development

The government will promote the introduction of FloodS, a Web service for flood forecasting that can be used for free, to local governments in Indonesia to stimulate demand. In order to expand the implementation, it is essential to further raise awareness of disaster risk reduction and to utilize support for efforts in adaptation areas from outside.

Profile of Project Company

Kanematsu Corporation was founded in 1889 as a general trading firm under the motto of "Contribution to society through creation of business". The Company strives to become a company that grows together with customers and incessantly aims for the creation of business. Setting "Environment, Society and Governance" as the key management principle, the Company considers climate change business as its management foundation and promotes REDD+ activities as part of the climate change business such as forest conservation, sustaining lives of local residents, and biodiversity conservation. In addition, the Company incorporates climate change adaptation as part of the environment policy.

Hitachi Ltd. was founded in 1910 . Promoting social innovation projects that realize a sustainable society through data and technology. Under the business structure of "Digital Systems & Services" to support customer DX, "Green Energy & Mobility" to contribute to the realization of a decarbonized society through energy and railways, and "Connected Industries" to provide digital solutions for connecting products in a wide range of industries, Lumada solutions utilizing IT, OT (control and operation technology), and products will solve customer and social issues. Driven by digital, green, and innovation, we aim to grow by collaborating with our customers.

Inquiry regarding this matter
Contact person: Kanematsu Corporation, Climate Change Operations Division, Steel, Materials and Plants Division Yazaki
E-mail: gx@kanematsu.co.jp

2. Examining the Earth as "Earth Doctor"

Kawasaki Geological Engineering Co., Ltd. http://www.kge.co.jp/

Challenges Addressed | ③ Floods, heavy rain & typhoons, ⑩ Economic loss & livelihood failure

Adaptation Challenge Disasters triggered by floods and landslides on account of climate change and frail soil foundation attributable to the tropical monsoon climate bring considerable damage.

Contribution Kawasaki Geological Engineering has contributed to the establishment of a disaster-resilient public infrastructure through its unique technology and know-how that have effectively been translated into landslide disaster prevention and mitigation.

Project Detail

Country | Vietnam

■ Background

The Project was selected for the "Climate Change Adaptation Effect Visualization Project" by the Ministry of Economy, Trade and Industry of Japan from 2013 to 2015. Despite its initial plan to cover the entire Great Mekong Subregion which is highly vulnerable to climate change, the Project was first launched in Vietnam where the framework of project execution was established earlier than any other country. Since then, we have conducted Japanese quality surveys from Japanese private companies and responded to requests for disaster relief from the local government, etc. From 2017 to 2021, we received an order from the local government for landslide survey design and construction work in Dalat City, and implemented the work. In 2023, the local government of Lam Dong Province and Dalat City requested advice from us regarding the landslide disaster that occurred near the construction site, and we proposed the importance of creating hazard maps, the need for legislation, and the correspondence of landslide disaster management in Japan and the private sector. In addition, we have maintained a relationship with the local government by giving a lecture at a workshop held by the Lam Dong Provincial People's Committee which around 200 experts from Vietnam and abroad attended.

■ Challenges and Responses in Business Expansion

In Vietnam, the concept of technology transfer and human resource development is fundamentally different from that of Japan, as technology and knowledge belong to the individual. We are considering a policy to develop human resources over the long term by making them understand the meaning of working for a company for a long period.

■ Key Success Factors

With the assistance of a local construction consulting company with which we established a relationship in conducting the feasibility study, we were awarded and completed projects from the Electricity General Authority of Vietnam (EVN) and Dalat City. In addition to proposing local firsts and maintaining relationships with local government and contractors, we utilize local collaborators with a Japanese mindset. Since advanced Japanese technology is over-performing, we are creating a system to effectively use basic civil engineering technology.

▲ Completion of landslide countermeasure works by well and drilling in Dalat city

Related SDGs

■ Business Model of the Project

We established a local representative office in 2014 for the launch of consulting services and raising awareness of the government and corporations. We successfully secured a deal from EVN (Electricity of Vietnam). We also conducted a survey, design, and construction relevant to landslides and constructed evacuation warning systems, proposed landslide prevention methods, and implemented countermeasures in the landslide-hit area of Dalat, a sightseeing spot in Vietnam. In the future, We intend to develop our business in Vietnam through technical/business tie-ups or capital alliances.

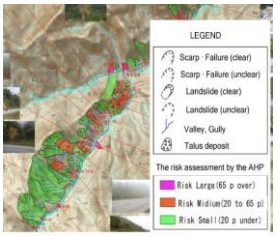
Product & Technology

We renewed our existing technologies both in terms of hardware and software for the prevention and mitigation of incline disasters and enabled the technologies to be operated successively and sustainably in Vietnam.

Monitoring System, Early Warning System : Exploration and measurement technologies, prediction technology of incline disasters, various analysis technologies, hazard risk assessment technology of potential outbreak of incline disasters using AHP (Analytic Hierarchy Process), design technology of landslide evacuation warning system leveraged on various measurement devices.

Packaging of Disaster Prevention and Mitigation Technologies:. Packaging with the technologies above with helicopter laser measurement offered by a partner company, Nakanihon Air Co., Ltd., geomorphic analysis technology such as satellite image processing, and the GIS (Geographic Information System) technology for general management. Local deployment and technical guidance of Japanese landslide countermeasure technology through planning and construction.

▲Emergency Survey and Installation of Monitoring Post for Prevention of Landslides



▲Illustration of Landslide Hazard Map

Challenges for Further Development

Going forward, while continuing its efforts of raising awareness for disaster prevention and mitigation, and developing engineers on a long-term basis, we plan to focus on the service orders and outsourcing demands from other companies for employee training and technical assistance to cope with challenges including risk management due to different business practices. We also plan to strengthen cooperation with Japanese companies that have entered the local market to create a sustainable business environment. Since local support, including legal development and administration, will also be required in the future, it is necessary to seek cooperation with Japanese aid organizations overseas and to understand local needs in detail.

Profile of Project Company

Kawasaki Geological Engineering Co., Ltd. was established in 1943 as Japan's pioneer in geological survey. The Company upholds a hands-on approach and offers a comprehensive package of survey, analysis, reporting, and consulting leveraged on the geophysical exploration and field measurement technologies. Based on the corporate philosophy of "Examining the Earth (Earth Doctor)", the Company's business scope stretches from the land surface, underground, and rivers to oceans across the Earth and provides diagnosis and consulting on each symptom for the establishment of a safe and affluent society. The Company also acts as a geological consultant overseas in the fields of ocean and energy (including renewable energy), soil and geophysical exploration, disaster prevention, and environmental survey. It also conducts soil exploration and natural environmental assessment besides incline disaster prevention mainly in Vietnam.

Inquiry regarding this matter
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Website: https://www.kge.co.jp/contact/

3. Water projects for realization of cooperative and rich society

Kubota Corporation http://www.kubota.co.jp/

Challenges Addressed | ③ Floods, heavy rain & typhoons, ⑦ Air, water & land-based pollution

Adaptation Challenge Frequent floods and droughts as well as water contamination due to climate change seriously affect society and economy of many developing countries that are highly vulnerable to climate change.

Contribution Kubota contributes to resilient infrastructure and supply of secure and safe water through its technologies, such as pipes used for water supply and sewage water facilities, drainage and irrigation pumps, water treatment membranes and wastewater treatment plant, which serve as adaptation measures against floods and water pollution.

Project Detail

■ Background

Country | UAE (Abu Dhabi), Bangladesh, Thailand, Vietnam, Myanmar, etc.

Kubota is tackling to solve the problems of developing countries through the products and technologies developed in Japan, such as pipes, pumps, and water treatment

■ Challenges and Responses in Business Expansion

This company has faced difficulties in its business expansion efforts. One of the challenges is the different needs and business customs that vary by country or region. They have been responding to customer demands by offering a wide range of products related to water infrastructure.

■ Key Success Factors

In the field of food, water, and the environment, which is a common issue around the world, we are seeking to develop markets with the brand strength we have built over the years and the close network with local communities.

Myanmar has long supported industrialization. In the field of water environment, capacity building activities are continued, and training and support of engineers are also being undertaken.

■ Business Model of the Project

Design, construction and equipment delivery are carried out in projects of international organizations and governments of developing countries.

Product & Technology

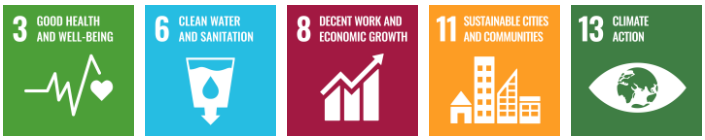
< Project Example >

Abu Dhabi: Steel Pipe Delivering Safe and Secure Water in Harsh Conditions

In Arab countries where 70% of the land is desert, household, industrial and agricultural water depends on desalinized seawater. The highly-durable ductile iron pipes supply safely this precious desalinized water throughout the region.

▲Ductile iron pipe

Related SDGs



▲Dual purpose pump station

Bangladesh: Dual purpose pump station for Flood and Droughts

In Bangladesh, rivers cover 10% of the land surface and the land is only 9m above sea level or below. In such environment, flooding during the rainy season and droughts during the dry season are a major problem. Thus, a project was launched to surround a specific area by levees, Kubota pumps were installed in the pump station that drains and draws water. Since the project was launched, agricultural harvest in this area has doubled. Kubota pump is thus contributing to the infrastructure for both flood prevention and agricultural development.

Thailand: Drainage pumps that contribute to the reconstruction from the flood

The 2011 Thailand floods that occurred mainly in the Chao Phraya River basin, Japanese government dispatched the Kubota's mobile pump trucks, and engineers of Kubota were dispatched as an international emergency disaster relief team. The pumps can empty a 25m-pool filled with water in just 10 minutes, weighing 95% less than conventional pumps. The feature of its high mobility enabled quick recovery from flood in various parts of Thailand.

▲Drainage works by the Japan Disaster Relief Team

▲Johkasou in hospital

Vietnam: Johkasou (Wastewater treatment tank) that improve hygienic environment in developing countries

Poor hygiene is posing serious threat to developing countries where rapid urbanization outpaces the development of sewage facilities. Kubota contributes to the improvement of hygiene and reinforcement of urban infrastructure in developing countries utilizing Johkasou that enable the treatment of sewage on site.

Myanmar: Water Purification and Treatment Plant that environmental friendliness through comprehensive water solution

Kubota has built water infrastructure including water purification plant, wastewater treatment plant and water supply system in the first SEZ in Myanmar, to which Kubota has exported agricultural machinery and irrigation pumps for over 60 years. These technologies have significantly contributed to the Thilawa SEZ in terms of harmony with surrounding environment and sustainable economic growth of Myanmar.

▲Water purification plant built in Zone A, industrial park in the Thilawa SEZ

Challenges for Further Development

As a comprehensive manufacturer of water infrastructure, we will work to improve the sanitary environment by improving water and sewage systems, and expand sales of technologies that contribute to disaster prevention measures, such as sump pumps and earthquake-resistant ductile iron pipes (HRDIP).

Profile of Project Company

Established in 1890, Kubota Corporation is Japan's largest manufacturer of agricultural machinery. The product line-up also includes small construction machinery, small industrial engines, pipes, pumps and environment-related plants. Under the corporate philosophy of "Contribution to society through business," Kubota has been delivering what society truly needs in the form of products, technologies, and services including increased food production and saving labor through agricultural machinery. Kubota also upholds "For Earth, For Life" and setting SDG's, the world's common themes, as its compass. Kubota Group will keep striving to realize the abundant living environment and development of society through tackling the global challenges in the area of "Food"," Water" and "Environment." In the area of water environment, Kubota aims at solving challenges through the provision of total solution services including individual equipment to aftersale systems diagnosis services leveraged on IoT.

4. Protecting local community from threat of high tide and sea level rise

TAISEI CORPORATION http://www.taisei.co.jp/

Challenges Addressed | ① Sea level rise

Adaptation Challenge Island nations are vulnerable to high tides due to insufficient height above sea level and are at the brink of submersion due to rising sea level associated with global warming.

Contribution TAISEI CORPORATION builds robust yet eco-friendly seawall in such vulnerable areas. In addition to enhancing disaster preparedness, the Company plays a key role in socioeconomic infrastructure and secure lives and assets of island people. Building robust seawall serves as an adaptation measure in the field of infrastructure.

Project Detail

■ Background

Country | Maldives

Male Island in the Maldives has been repeatedly hit by high tides due to flat landscape which is only 1.5 meters above sea level. Unusually high tides in 1987 and 1988 wrecked existing seawall structures and residences, paralyzed government operations and the total damage was worth 6 million US dollars. The Island is also at the brink of submersion due to the sea level rise associated with global warming. The Maldives is heavily dependent on the import of construction materials and much of the concrete aggregate was delivered from neighboring Malaysia and Singapore. Water for construction and domestic use by workers came from desalinated sea water. To conserve natural environment from adverse effects of construction, the Company set out self-disciplinary principles and refrained from coral stone mining. All such efforts bore fruit at the time of major earthquake off Sumatra in December 2004 when the Island had no human casualty and very little collateral damage which significantly contributed to saving human life and maintaining key government functions.

■ Challenges and Responses in Business Expansion

In the Maldives, due to the reliance on imports for most construction materials, aggregates for concrete and other materials are transported from nearby countries like Malaysia and Singapore. For construction water and workers' domestic water needs, seawater is utilized after desalination to remove the salt content. Measures have also been taken to minimize negative impacts on nature, such as avoiding the extraction of coral stone.

■ Key Success Factors

High-quality infrastructure was developed through the construction of eco-friendly seawall reflecting local demand. Next focus is to improve cost-competitiveness and technological differentiation for further development.

▲Bird's-eye view of Male Island

Related SDGs

■ Business Model of the Project

The Japanese government offered grant aid to support the construction of seawall. TAISEI CORPORATION took on the construction of breakwater along the south coast of Male Island in 1987 which stretched 6 kilometers around the Island as robust seawall.

Product & Technology

- Sloped revetment using ripraps and tetra pods
- Vertical seawall using concrete blocks and caissons (large concrete or steel boxes used in construction of seawall and other underwater structures or underground structures) and others

The traditional seawall built by the government of Maldives is made of piled coral mass coated with mortar and is vulnerable to wave pressure. Thus the Company applied the above-mentioned technology to build a staunch and durable seawall for long use which helps to mitigate maintenance burden while enhancing disaster preparedness.

▲Visual Illustration of Seawall

Challenges for Further Development

Going forward, the company will focus on strengthening cost competitiveness and differentiation in terms of technology for further development.

Profile of Project Company

TAISEI CORPORATION was founded in 1873 and established itself as one of five super general contractors, with unique strength in large-scale construction and civil engineering works including skyscrapers, airports, dams, bridges and tunnels. Its core competence lies in technology and close-knit group structure built on its early presence overseas. The Company won the submarine tunnel project under the artificial "Palm Island" off Dubai with much credit to its groundbreaking proposal outshining European and American competitors. The Company was also highly accredited for its consideration on environmental aspects by local community (catching fish feared to be affected by construction works beforehand and releasing them upon completion, or restoration of seaweed bed). Under the group philosophy of "Creating a Vibrant Environment for All Members of Society", TAISEI CORPORATION, through its construction activities, strives for the development of high-quality social infrastructure and improvement of the living environment in harmony with nature. The company recognizes "the realization of a sustainable and environment friendly society" as a material ESG initiative.

Inquiry regarding this matter
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5. Method for prevention of soil surface erosion with soil algae (BSC method)

Nippon Koei Co., Ltd. https://www.n-koei.co.jp/english

Challenges Addressed | ③ Flood, Heavy rain, Typhoon

Adaptation Challenge Biological Soil Crust (BSC) method functions to prevent soil erosion and slope collapses caused by increased rainfall intensity due to climate change and accelerates invasion of surrounding vegetation by spraying soil algae products, widely distributed in Japan and all over the world. BSC method contributes to adaptation challenge by quickly initiating natural vegetation succession.

Contribution Nippon Koei (NK) developed a technology to prevent surface soil erosion by using soil algae in collaboration with Public Works Research Institute (PWRI), in the course of a research on countermeasure to the red soil runoff that was polluting the rivers and coasts of the southwestern islands in Japan.

Project Detail

■ Background

Country | Nepal, Malaysia

During research on countermeasures to red soil runoff in Okinawa, NK discovered through observation that the amount of sediment was lower in areas where soil algae had developed. Subsequently, in fields that have formed BSC (colonies of soil microorganisms formed by algae, moss, etc. entwined with soil particles), the amount of sediment was reduced to 1/10 to 1/20.

After repeated research, NK, jointly with PWRI, developed a slope erosion prevention method (BSC method) that utilizes soil algae, and obtained the patent right in Japan of BSC method in 2009. In collaboration with Nikken Sohonsha Corporation (Hashima City, Gifu Prefecture), which has algae cultivation technology, BSC material production was commercialized as civil engineering material, and it was registered in Ministry of Land, Infrastructure, Transport and Tourism's New Technology Information System (NETIS) in 2018 and selected as a technology to promote utilization in 2022. The patent rights were granted in Malaysia, Indonesia, Mexico, China and Taiwan and are currently under examination in four (4) countries, including India, and at the European Patent Office (EPO).

Through JICA project to promote dissemination of private-sector's technology for social and economic development in developing countries, NK demonstrated BSC method in Nepal (2019 - 2021) and in Malaysia (2022 - 2023) to promote understanding of its usefulness. Based on the results, NK is applying the certification of the construction method by Road Department in Malaysia.
As ability to retain soil moisture has been recognized, BSC method was displayed at the International Horticultural Exhibition EXPO 2023 Doha Qatar.

■ Challenges and Responses in Business Expansion

BSC materials must pass plant quarantine in some countries, but as those are new products for importing countries, it is difficult for them to understand the materials. Exporting a small amount for research purposes is relatively easy to be approved, and exporting as commercial purposes will be followed.

■ Keys Success Factors

Assuming government agencies that deal with local issues (e.g. turbid water issues) as potential customers, and by conducting trial construction with supports from them became stepping stones to business development. By promoting BSC method through dissemination by seminars and PR; collaboration with academic institutions (technology guarantee), and trial demonstration, the new projects will become to be materialized.

▲demonstration results in Malaysia

Related SDGs

■ Business Model of the Project

The examined business model for this method is as follows: 1) implementing trial on-situ constructions through JICA projects, own fund, etc., 2) disseminating the superiority of the BSC method, 3) applying and receiving construction method certification from local government agencies, and 4) being implemented in public projects by the government.

Products & Technology

At the initial stage of vegetation succession, BSC is formed naturally, and as the environment improves, grasses and other vegetation grow, followed by trees. By taking advantage of this phenomenon, BSC method enables the BSC formation in a short period (2 weeks to 1 month) by spreading soil algae and allowing them to dominate on the surface of the soil.

Soil algae applied in BSC method is cosmopolitan species, habituating in all over the world. As it is hermaphrodite and increases by clonal proliferation, there is no risk of hybridization and genetic disturbance; thus, applied in areas which intrusion of invasive species is not accepted.

No casting cement on slopes nor wire lath net putting are needed, but only spraying liquid of soil algae on the slope surface are needed using conventional spraying equipment..

BSC method can be applied in combination with conventional methods such as seed spraying, vegetation sheet/mat covering, works, for the areas other than protected areas.

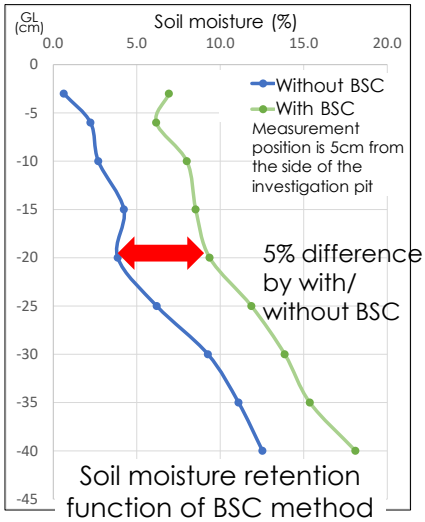
Helicopters/ radio-controlled helicopters can be used for spraying in mountainous area

The soil moisture retention function of BSC method has been found through trial implementation at a source of blown sand (see the figure on the right). This feature may lead to the attention for its potential to reduce watering volume and promote greening in dry areas.

Before spraying

2 months after spraying

▲BSC method application to mountainous aeras by radio control helicopter



Soil moisture retention function of BSC method

Challenges for Further Development

Preparations to obtain approval as a certified construction method in the countries where the trial demonstration were carried out are underway. NK also considers introducing BSC method into other countries, mainly in Asia, and developing businesses other than erosion prevention. When extending this business, the plant quarantine needs to be passed for commercial purposes, even the quarantine was passed for research purposes. Adding to accumulating the accomplishment of trials and publicizing the trial results in various countries, and collaborating with existing greening product companies, NK proceeds with research and development of soil algae cultivation technology with the aim of reducing production costs through local production of materials.

Profile of Project Company

Nippon Koei Group is Japan's No.1 sales construction consultant company that supports the safety and security of people's life and living around the world. Since the establishment in 1946, it has been engaged in solving social issues as a leading company in Japan through the business of developing social infrastructures and has developed sustainable businesses that are fundamental to national and human development in more than 160 countries and regions. Various projects related with adaptation and mitigation of climate change have been implemented both in Japan and overseas.

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6. Disaster risk reduction by river water level alarm system

Unimation System Inc. https://www.unimation.co.jp/index.html

Challenges Addressed | ③ Floods, heavy rain & typhoons

Adaptation Challenge In the Philippines, measures to prevent or reduce disaster is an urgent issue because Philippines is affected by climate events such as typhoons. Especially, frequent occurrence of river water flooding due to undeveloped sewage system and lack of technology and institutional capacity for disaster management cause serious disaster risk.

Contribution River Water Level Alarm System of Unimation System Inc. can send alert of occurrence of river water flooding to local people, collect information of river water level, and control/forecast occurrence of flooding for wide area in high disaster risk area. The Alarm System of Unimation System Inc. contributes to prevention of disaster and reduction of disaster risk for local residents even though it is worried that typhoon becomes larger with higher frequency due to climate change.

Project Detail

Country | Philippines

■ Background

Unimation System Inc. (herein after Unimation) is a specialized company dealing in equipment for disaster prevention such as River Water Level Alarm System, Flood Warning Unit for Road, and Flood Warning System and has been selling the equipment in Japan. After the major flood disaster in Thailand in 2011, Unimation found that its technology and products are in need in countries outside Japan, and hence started thinking about developing its business abroad. Afterward, they has joined Grassroots Technical Cooperation Project (City of Iloilo, Philippines) using JICA Business Model Formulation Survey and JICA Verification Survey ("Establishment of Disaster Prevention System using River Water Level Alarm System in Philippines" in Cebu City and Talisay City etc. in Metro Cebu) and examined their business development in developing countries where seriously causing disaster such as flooding.

■ Challenges and Responses in Business Expansion

There were few difficulties related to the contract, as the product was delivered via JICA through an introduction by the CityNet Yokohama Project Office in Yokohama, but the documentation for export procedures was difficult due to unfamiliarity with the process.

▲River Water Level Alarm System

■ Key Success Factors

In promoting commercialization in the Philippines, the company not only installed Unimation System's river level warning units, but also collaborated with other companies (in this case, a company that specializes in radio-radio) to propose more effective solutions to meet local needs. When doing business in developing countries, it is often necessary to combine multiple products and technologies to solve problems, so it is effective to cooperate not only with one's own company but also with other companies.

▲Image of Setting of Alarm System

Related SDGs

■ Business Model of the Project

Unimation implemented the Project in cooperation with concerned government staff and other stakeholders through JICA scheme. Unimation aims at expanding services in Southeast Asia from Metro Cebu in Philippines with consideration for advantages for sales promotion such as large population, strong initiative for inviting foreign investment, and rather short distance from Japan.

Product & Technology

River Water Level Alarm System: The equipment continuously monitors water level of river and when a preset trigger level (6 levels of water level can be set) is reached, warning signals are instantaneously released by rotating warning lights, sirens and speakers, as well as by emails sent to pre-registered email addresses. Lead time of alarm can drastically shorten because the equipment sounds the alarm by itself. Moreover, the system lower cost than other alarm system because server is not necessary for the system.

Flood Warning Unit for Road: The equipment uses a the sensor which can be installed in narrow place such as side of road and can call attention in the place where water is retained easily such as under path, elevator pit, and drainage ditch. Even if communication system stops due to disaster, the system can detect current water level and increasing water level of current location and display, warning signals, and alarm can be activated and pedestrians and cars can be alerted.

▲Flood Warning Unit for Road

By installation of the abovementioned equipment, alarm of flooding and evacuation signal are given and human damage can be minimized. Moreover, required maintenance for the equipment is only cleaning its cover. The cost for establishment of disaster prevention system tends to be lower than other large scale systems.

▲Installation of Alarm Unit (City of Iloilo)

▲Installed Alarm Unit (City of Iloilo)

Challenges for Further Development

In developing countries, needs of disaster prevention is bigger, however, installation of equipment is often difficult because of cost. Initial and maintenance cost of Unimation's equipment is lower than other company's. However, to develop sales channel in Southeast Asia, it's necessary to produce equipment in Philippines and develop low cost model.

Profile of Project Company

Since the foundation of the company in 1979, Unimation specializing in disaster prevention products, has manufactured, sold, and developed its flood early warning system, and also developed a website related to flood early warning system along with management services. Unimation sells and produces River Water Level Alarm System, Flood Warning Unit for Road, Flood Warning Sensor, ultrasonic sensor etc. and contributes for prevention and reduction of disaster in local areas in Japan.

Inquiry regarding this matter
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7. Disaster prevention system through real-time image data distributed by river monitoring cameras

eTrust Co., Ltd. https://www.etrust.ne.jp

Challenges Addressed | ③ Floods, heavy rain & typhoons

Adaptation Challenge Typhoons, hurricanes, and torrential rains, which are becoming more severe due to climate change, can cause river overflows and floods, putting human lives and infrastructure at risk.

Contribution eTrust's disaster prevention system using river monitoring cameras can help reduce the risk of disaster by providing real-time information on river conditions to local residents and others, thereby identifying the risk of overflows and floods in advance.

Project Detail

■ Background

Country | Malaysia, Philippines, Bangladesh, Brazil, etc.

The disaster prevention system using river surveillance cameras installed in Nagaoka City, Niigata Prefecture, has been well received and is now being promoted and deployed in developing countries due to its inexpensive price range. Starting with the Philippines, the company has so far installed disaster prevention systems in Malaysia, Myanmar, Bangladesh, and Brazil, utilizing projects from JICA and government ministries and agencies.

■ Challenges and Responses in Business Expansion

The local maintenance and management system was not sufficiently established, and communication was sometimes interrupted. Therefore, the company is considering developing hardware that makes initial setup easier and exporting systems with roaming-capable Japanese low-cost SIMs inserted to eliminate the need to maintain a local communication environment.

■ Key Success Factors

The product is a disaster prevention system developed in-house in response to the needs of Japanese municipalities, and is less expensive than products from major manufacturers, making it easy to introduce to developing countries. In addition, its cloud-based nature simplifies the structure, eliminating the need for local technology transfer. The system can be installed and operated with just a simple lecture or materials, and it is also possible to provide support remotely.

■ Business Model of the Project

Malaysia: Disaster prevention system using low cost and high-performance water level gauges

eTrust Co., Ltd participated in "3L Water Level Gauge Test Construction Project" led by Ministry of Land, Infrastructure, Transport and Tourism for the purpose of introducing Japanese water level gauges. eTrust's water level gauges and cameras have been installed in a river in Kuala Lumpur to demonstrate their usefulness.

Philippines: Local economy-based disaster prevention system for farming villages around the lake

In order to monitor changes in tributaries flowing into Laguna Lake, the largest lake in the country, six cameras and water level gauges were installed through JICA's Grassroots Technical Cooperation Project. A workshop was held to provide lectures on system operation and management methods.

▲Philippines, Malaysia

Related SDGs

Bangladesh: Disaster prevention system using solar power and wireless communication

Through a feasibility study under the then Ministry of Foreign Affairs of Japan's ODA Overseas Economic Cooperation Project, cameras and water level gauges were installed along the Meghna River. The system demonstrated that it is possible to collect and transmit river information even in an environment where infrastructure such as power and communication lines are not yet in place.

Brazil: Disaster prevention system using network infrastructure

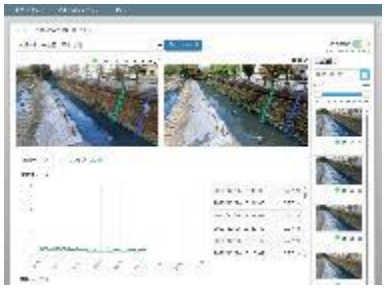
As part of a research project commissioned by the Ministry of Internal Affairs and Communications Japan, three cameras and a water level gauge were installed in the lower reaches of the Iguaçu River. The acquired data was transmitted to the local disaster prevention bureau and fire department. When the water level reaches a dangerous level, an alert e-mail is sent, supporting the prompt issuance of evacuation warnings.

▲Bangladesh, Brazil

Product & Technology

Cloud-based disaster prevention monitoring system STAND GUARD: The system automatically captures images of rivers at regular intervals and transmits them to a cloud server via mobile networks, allowing users to view the images on a dedicated website. The system operates on solar power and can be installed in off-grid areas. Traditionally, it would have been necessary to install both a camera and a water level gauge in order to monitor water levels, but the AI incorporated into the camera makes it possible to combine both functions into a single system. Inexpensive and low-power-consumption systems have been realized by applying smartphone technology. Solar panels and batteries have also been miniaturized, making the system affordably priced for introduction in developing countries. In addition, based on monitoring data analyzed by AI, alerts are sent out via SMS from the cloud when dangerous water levels are reached.

▲ Edge AI camera (prototype)



▲ Cloud Monitoring Screen

▲The AI detects the surface of the water on the captured image.

Challenges for Further Development

We will expand overseas business while leveraging our partner companies and the connections we have established with local municipal offices through past projects. By continuing to develop and improve the system, including making setup even easier, we will contribute to mitigating damage from windstorms and floods that occur around the world through early warning.

Profile of Project Company

Established in 1935 as a motor repair business in Nagaoka City, Niigata Prefecture. Since establishment, the company has made it a management policy to continue to be "a presence needed by society" and has developed its business activities centering on the telecommunication industry. Since the 2004 Chuetsu Earthquake and flood damage, together with Nagaoka City, the company began developing a disaster prevention monitoring system for the city called Nagaoka Disaster Prevention Information System, and has continued to develop disaster prevention systems ever since.

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8. Functional paving materials made from waste roof tiles and bricks to reduce urban flooding and heat island effect

ECOSYSTEM Inc. https://eco-system.ne.jp/index_eng.html

Challenges Addressed | ③ Floods, heavy rain & typhoons, ④ Extreme temperature changes

Adaptation Challenge Torrential rains, typhoons and hurricanes have been occurring more frequently due to climate change. In urban areas, ground surfaces are paved with asphalt and concrete, making it difficult for water to seep into the ground and be absorbed. Therefore, urban flooding occurs when rainfall and water levels exceed sewage treatment capacity. Moreover, rising temperatures will exacerbate the heat island effect, causing health problems and ecological changes.

Contribution ECOSYSTEM contributes to reducing urban flooding and the heat island effect by paving the ground with waste roof tiles and bricks that have permeability and water retention properties.

Project Detail

■ Background

Country | Vietnam

Ceramic products such as roof tiles and fired bricks, which are used as raw materials for pavement, are found in many parts of the world, especially in Europe, Southeast Asia, and South America. In order to capture this market, ECOSYSTEM is considering expanding overseas. The project has been adopted by the Ministry of the Environment, the Ministry of Economy, Trade and Industry, JICA, and UN-HABITAT as a FS project, etc., and is being considered for commercialization in Vietnam and other countries through feasibility studies and local demonstration projects. In Vietnam, test construction has been conducted in Hanoi and Haiphong, and permeability during rain, reduction of road surface temperature, and sufficient surface strength have been confirmed. In addition, to meet the needs of Vietnam, which has many sidewalks in the form of blocks, roof tiles, etc., the company has conducted repeated tests using local construction waste materials and succeeded in producing blocks. If a system can be established to stably obtain construction waste materials of sufficient quality for manufacturing pavement materials in the vicinity of the affiliated plant, it is expected to be deployed in various locations such as industrial parks and commercial areas in Vietnam, where pavement materials with water permeability and water retention functions are not available.

■ Challenges and Responses in Business Expansion

Since the pavement material would not be accepted locally if its price is far from that of pavement materials commonly used in Vietnam, we adjusted the ratio of materials used and tried to find a balance between price and strength. Since it was necessary to use local waste roof tiles and bricks in conducting the tests, we repeated mixing tests on site and succeeded in producing blocks with a good balance between price and strength.

▲Discarded construction waste materials (roof tiles and bricks)

▲Test construction

■ Key Success Factors

While it is common to recycle construction waste for roadbed materials, the use of porous waste roof tiles and bricks as pavement material added water permeability and water retention functions. Another success factor was the enhancement of the landscape by partnering with a local factory that could handle a wide range of coloring.

Related SDGs

■ Business Model of the Project

In Vietnam, construction waste and off-specification products from roof tile and brick factories are landfilled or illegally dumped as industrial waste. Local partners (ceramic product manufacturers, construction companies, industrial waste companies, etc.) will contract with Ecosystem's local joint venture company to provide manufacturing know-how for permeable blocks. A business model is planned in which the local partners and the joint venture company will work together to purchase waste roof tiles and bricks, recycle them, and sell them to private companies and public organizations. This business model requires crusher systems and pavement block manufacturing machines, and the company will also provide hardware, engineering, and other services based on its know-how cultivated in Japan.

Product & Technology

Waste roof tiles and bricks are crushed by crushers to produce gravel and sand products, which are then used as gardening materials, roof tile chips, and paving materials. Since roof tiles and bricks are porous, water-permeable and water-retentive pavement materials using these materials can reduce urban flooding and the heat island effect. This upcycling technology is characterized by its potential for recycling, adaptation, and mitigation of construction waste materials, which are increasing with urban development. In addition, by providing pavement materials that meet local environmental, landscape, strength, and cost needs, the technology can meet a wide range of demands. In addition, it is expected to increase environmental awareness in the area where it is introduced.

▲Waste roof tiles and bricks

▲ Permeable blocks manufactured at block manufacturing plant

▲Road paved with waste roof tiles and brick blocks

Challenges for Further Development

By promoting the use of water-retaining and water-permeable pavement materials made from waste roof tiles and bricks in Vietnam, the project will reduce damage caused by flooding and the heat island effect, as well as contribute to the country's health and safety issues caused by illegal dumping and its goal of recycling 60% of solid waste from construction by 2025. However, since the roof tiles and bricks produced by each manufacturer for local consumption vary in manufacturing techniques, it is important to determine the level of locally disseminated products when manufacturing recycled products.

Profile of Project Company

Established in 1994, ECOSYSTEM started its recycling business in 1997 when the company reused contaminated sea sand as paving material in the Nakhodka oil spill. ECOSYSTEM, with a corporate philosophy under which it aims to create ecosystems, has a wealth of knowledge and experience in the recycling of roof tiles and bricks, including roof tile chips. In Japan, the company is engaged in the disposal of waste roof tiles (intermediate industrial waste disposal business), roof tile paving, franchising of Mobacon, and internet sales of roof tile chips and others. In 2017, the company received the Hokuriku Bank Mirai Innovation Grand Prize, and in 2018, ECOSYSTEM won the Grand Prize at the SDGs Business Contest, Global Innovator Award at the SDGs Business Awards, and Grand Prize at the Ishikawa Eco Design Awards.

9. Waterproofing and Extending the Service Life of Buildings with Concrete Repair Materials

ZEN Co., Ltd. https://zen-kaisyu.jp/

Japan Prolong Limited Company http://everprolong.jprolong.net/

Challenges Addressed | ③ Floods, heavy rain & typhoons

Adaptation Challenge With the increase of wind damage, floods, and storm surges caused by climate change, concrete gradually erodes from the surface and deteriorates due to neutralization and salt damage caused by contact with CO2 in the air and water. Deteriorated concrete develops voids and cracks, which not only cause water leakage but also lead to the weakening and shortening of the service life of buildings.

Contribution The Ever Prolong method, developed by ZEN and Japan Prolong, densifies the concrete surface by penetrating it with Ever Prolong material. By densifying, the concrete structure becomes waterproof, and its surface protection function is strengthened, thus extending the service life of buildings.

Project Detail

■ Background

Country | Philippines

In the Philippines, the construction industry has become a major industry due to construction rush associated with urbanization and population growth. In urban areas, many buildings are made of reinforced concrete, many of which are more than 20 years old and have become decrepit. In addition, high precipitation throughout the year results in water leakage damage due to cracks in concrete, in houses, schools, hospitals, commercial facilities and so on. In 2019, the company was selected for a basic study for a JICA private-sector partnership project and conducted a market survey in the Philippines. Utilizing the connections established through the private-sector partnership project, the first export was completed in 2023.In the future, the project will be commercialized through on-site demonstration activities.

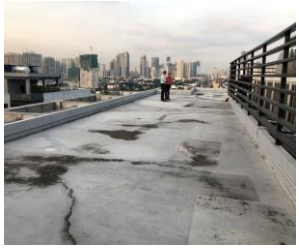
■ Challenges and Responses in Business Expansion

When considering business in developing countries, building connections and language were challenges. In addition to building relationships of trust through regular communication, the company is currently working to resolve these issues by conducting sales activities through Japanese companies.

▲Applying Ever Prolong

■ Key Success Factors

Low initial cost, and the price is set to ensure market superiority in developing countries.Installation method is simple and easy to handle. In addition, concrete applied with Ever Prolong is maintenance-free, with a durability of 10 to 20 years after a single application, so there is no need to establish a local maintenance system.



▲ Cracks on a building roof (Philippines)

Related SDGs

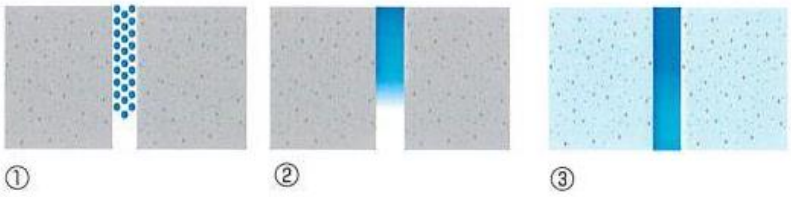
■ Business Model of the Project

Concrete repair materials (Ever Prolong) are planned to be exported and sold to local construction companies. In addition, training and guidance (supervising) on construction techniques are planned to be provided to these companies.

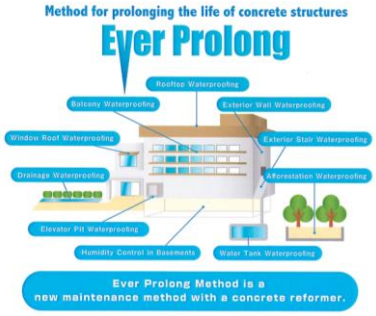
Product & Technology

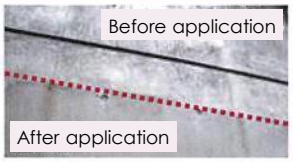
Ever Prolong: An odorless and harmless concrete modifier (repair material) consisting of a silicate-alkali mixture. When diluted with water and applied or sprayed on the concrete surface, it penetrates and fills the pores of the surface layer of a few centimeters to form a dense protective layer. It closes small cracks in the concrete and allows moisture inside to escape to prevent freezing, while exhibiting waterproof performance against rain. The densification of the concrete surface also prevents adhesion of dust, mold, moss, and algae. It can be used for a wide range of purposes such as waterproofing of rooftops, exterior walls, exterior stages and elevator pits, simple balcony waterproofing, moisture control of basements, and can be applied to all types of concrete.

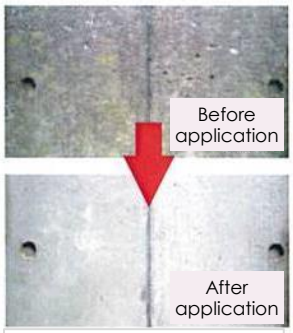
① Ever Prolong is applied to the concrete surface and penetrates by capillary action.
② Reactive gel with stable structure is produced.
③ Reacts with suspended Ca to produce stable alkali calcium silicate, forming an adhesive protective layer



▲ Mechanism of Ever Prolong







▲ Application Examples

Challenges for Further Development

In the future, we will promote full-scale business in the Philippines, but to commercialize this business, it is required to obtain cooperation from companies that have connections with the local market. In addition to the Philippines, there is interest from various other Asian countries. With the utilization of external support, there is an acceleration of business development in developing countries, and the consideration of local production for the future is underway.

Profile of Project Company

ZEN Co., Ltd: Established in May 2002. ZEN's main business is the renovation of condominiums and commercial buildings. ZEN has completed more than 10,000 projects in Japan, and is committed to environmental conservation and efficient use of natural resources, based on the principles of "gratitude, inspiration, trust". In order to extend the service life of buildings and to further develop the concrete technology in frame waterproofing, ZEN is working with Japan Prolong on the application, technical studies, and research on relevant technologies of Ever Prolong.

Japan Prolong Limited Company: Established in January 2013, Japan Prolong has been mainly engaging in research and development, domestic manufacturing and sales of Ever Prolong, focusing on the fields of concrete life extension and waterproofing of building frames. Ever Prolong was adopted in the New Technology Information System (NETIS) of the Ministry of Land, Infrastructure, Transport and Tourism in 2018.

10. Securing water for domestic use and reducing flood damage through underground rainwater storage tanks

Daiken Co., Ltd. https://d-ken.jp/

Challenges addressed | ②Droughts, ③Floods, heavy rain & typhoons

Adaptation Challenge Extreme weather events, which are becoming more extreme due to climate change, are causing droughts and torrential rains in many parts of the world, causing serious damage to people's lives.

Contribution Daiken has developed an underground rainwater storage tank capable of storing large amounts of rainwater and purifying it to drinking water quality. The tanks have been installed underground in residential areas and public facilities, contributing to securing stable drinking water and reducing flood damage.

Project Detail

Country | Indonesia, Kenya, etc.

■ Background

Daiken, which provides compensation services and civil engineering designs for public projects, was looking for the second pillar of business when they developed the underground rainwater storage tank "nickname; Tametotto" with Kyushu University by utilizing the subsidiary aid granted from the Ministry of Economy, Trade and Industry. Starting from the installation in the residential area of Fukuoka Prefecture in 2012, 2 years later in 2014, "Tametotto" was installed in an elementary school in Laos by the request of UN-HABITAT. In 2021, there was an order from the Ministry of Foreign Affairs for a project in Indonesia. Although it was in the midest of COVID, they were able to complete the installation fully remote by creating a manual. To today, the company has driven projects in Vietnam, Kenya, Nepal, and other countries, many by the request of UN-HABITAT.

■ Challenges and Responses in Business Expansion

In the beginning of the "Tametotto" project, the concept of the SDGs were not well understood, so there were some difficulty in gaining support. While the company continued showing results mainly by the request from UN-HABITAT, the concept of SDGs also became familiar to general public. Now, Daiken's reputation is increasing by reporting SDGs activities along with its financial results, which has had a positive impact on recruitment as well.

■ Key Success Factors

We have been working on overseas projects after receiving numerous requests from UN-HABITAT for the following reasons

- Low cost of construction
- Short construction period
- Use of locally available materials
- No special construction skills required; local personnel can handle the work
- Easy post-construction management

▲At the time of construction in Indonesia in 2021

Related SDGs

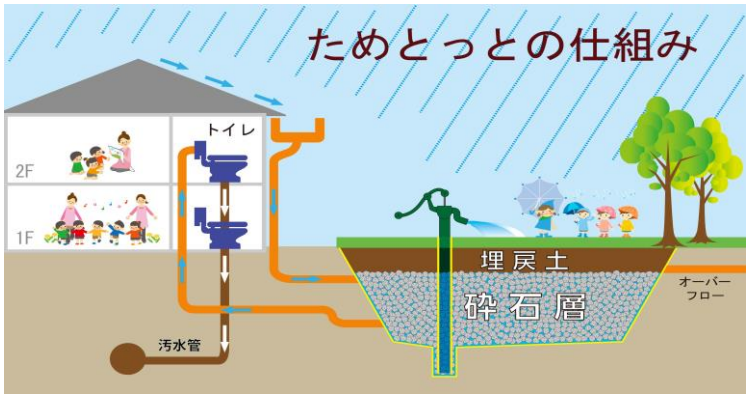
■ Business Model of the Project

Construction is performed at the request of UN-HABITAT and other organizations. Since no special skills are required, the construction will be carried out by local workers based on the design prepared in Japan. Microbial activator will be brought from Japan, but other materials will be procured locally.

Product & Technology

Rainwater Storage Underground Tank "Tametotto": A system that can store a large amount of rainwater in a short installation period, and purifies it into drinking water quality. Attach a protection sheet and water blocking sheet to the excavated hole, and install a casing pipe to intake water. Place crushed stones in the hole with an approximately 50% gap between each, which will allow the rainwater to be stored and used. After installation, which usually takes around a month, and in the shortest case only a week, the system can continuously be used with only minor maintenance. Installation difficulty increases in areas where there are underground waters, so it is expected to be installed in residential areas where there are no underground water, and store the water that was originally supposed to return to nature, such as rivers and underground, to use as drinking water and water for daily life.

In addition, simulation results show that "Tametotto" can reduce rainwater runoff; compared to cleared land, rainwater flows during the peak of flooding were reduced by 13.4% and also the peak came approximately one hour later.



▲Structure of "Tametotto"

Challenges for Further Development

The compaby aim to roll out the rainwater storage underground tank "Tametotto" which is a system of both flood control and irrigation, as a disaster mitigation facility which saves lifes from torrential rains and an urban mini-dam that secures stable drinking water conveniently. Most oversea projects are currently a request from UN-HABITAT, so establishing the monetization scheme will be the future challenge for a sustainable business. Domestically, the challenges are to work together with partner companies and organizations to roll out "Tametotto" to local disaster evacuation sites, parks, schools and convenience store parking lots etc.

Profile of Project Company

Established in 1974, the company engaged in "Urban Development" business such as compensation services for public projects, civil engineering design and architectural design. Developed the rainwater storage underground tank "Tametotto" and rolled them out overseas, by the collaboration of industry, government and academia. In 2023, the company opened its first overseas subsidiary, Daiken Vietnam. They will expand the "Urban Development" technology cultivated in Japan, to Vietnam. They have received numerous awards, including the Kyushu Regional Development Bureau Director-General's Award from the Ministry of Land, Infrastructure, Transport and Tourism.

Inquiry regarding this matter
Contact person: Daiken Co., Ltd., Land Management Division, Oyama, Okamoto and Kuan
Phone: +81-92-851-3900
E-mail address: daiken@d-ken.jp * It would be helpful if you could write Tametotto in the subject line of the e-mail.

11. Disaster prevention technology originating in Japan to be deployed globally

SAKIGAKE JAPAN Corp. https://sakigakejp.com/

Challenges addressed | ③Floods, heavy rain & typhoons

Adaptation Challenge Japan is a disaster-prone country, and while there are many Japanese companies that possess advanced disaster prevention technologies, language barriers and other factors have prevented them from expanding overseas.

Contribution SAKIGAKE JAPAN has established a database of disaster prevention exchanges to match the advanced disaster prevention technologies of Japanese companies with overseas needs for strengthening disaster prevention measures, thereby supporting the overseas expansion of Japanese companies and contributing to the improvement of resilience overseas.

Project Detail

Country | India, Singapore, etc.

■ Background

The global market for disaster prevention is expected to grow to twice the size in the next 10 years starting from 2020, due to more severe and more frequent disasters caused by climate change. Japan being the disaster-prone country which has experienced numerous disasters in the past, has many domestic companies that possess advanced disaster prevention technologies. SAKIGAKE JAPAN, which aims to discover Japan's outstanding disaster prevention technologies and systems, and roll them out globally, has established a database of "Disaster Preparedness" and provide a matching service for needs and seeds of disaster prevention. So far, SAKIGAKE JAPAN has contributed to a number of matchmaking, such as arranging business meetings between domestic seed companies with water treatment technology which were listed in the database, with a Malaysian Tech start-up which showed the needs for water treatment technology that was essential when managing disaster.

In addition, the company also provides marketing activities to support raising awareness to adapt to climate change. They have attended the "2023 Disaster Response & Management Expo" held in Mumbai, India. SAKIGAKE JAPAN also engages in projects to investigate the obstables when rolling out disaster prevention technologies to target areas and share feedbacks to partner companies, as well as distribute video contents of distinguishing Japanese environment adaption technologies to the global audience, by request from international authorities.

■ Challenges and Responses in Business Expansion

Due to differences in business practices between different cultures, there are limits to the approach from Japan. Therefore, we try to build a network with local organizations and human resources in advance, and to establish a cooperative system to some extent before proceeding with local business negotiations.

■ Key Success Factors

They are succeeding in supporting Japanese companies which have advanced disaster prevention technologies but have not been able to expand business overseas due to language barriers etc., roll out overseas by matching with other tech/companies within the database. The success cases as a platformer is fostering motivation of Japanese companies which have progressive technologies, to register to the Disaster Preparedness Database.

▲ 2023 Disaster Response & Management Expo @India

Related SDGs

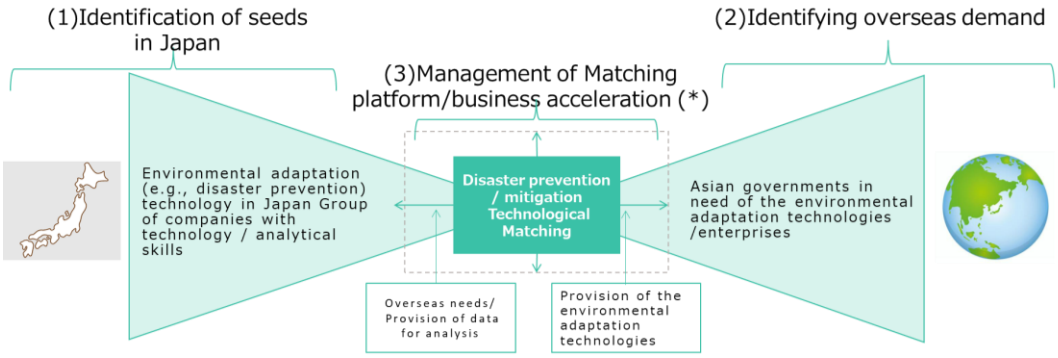
■ Business Model of the Project

Small and medium-sized enterprises (SMEs) with disaster prevention technologies have weak sales capabilities and face challenges in marketing their products, and SAKIGAKE JAPAN has established a business model in which it conducts surveys of local needs and provides guidance on packaging methods, earning an intermediate commission when business negotiations are concluded.

Product & Technology

Disaster Preparedness Database: The database contains over 500 disaster prevention technologies and services from all over Japan. It is designed to match technologies across Japan and leverage synergy, rather than providing individual technologies One for One. The three main functions are as follows

- Searchability: Search/organize by the necessary criteria for disaster response. Attribute information such as company name and service overview, and practical information such as functional details and cost are registered.
- Comprehensiveness: Covers all kind of disaster prevention technology in Japan. Currently, there are 500 companies registered, but they will be expanded by including more domestic companies and overseas information.
- Practicality: Use case based on actual disaster management practices. Collaborates on research with University of Tokyo's Institute of Industrial Science, and business collaboration with 100 disaster prevention companies.



▲Business Model Overview

Challenges for Further Development

Currently, the company is targeting to create the business model in Japan, however in the future, they will roll out the model to overseas. In order to expand business, database also needs to be expanded, so the company is trying to build relation with more Japanese companies that have disaster prevention technology by participating in events etc. Additionally, in the future, the company plans to build a portal which other companies can join, and considering to provide total support for overseas development, including corporate marketing, through the portal.

Profile of Project Company

In order to create a sustainable future, the company is driving business to discover Japan's progressive disaster prevention technologies and systems, roll them out globally, and attract collaborative companies and funds from around the globe. Founded in January 2023 with the mission of becoming the world's "pioneer" in disaster prevention and environmental adaptation technologies, the company was selected for the "Overseas Expansion Support Program" by the Tokyo Metropolitan Government in August 2023. Currently, they are establishing a base site in Singapore where it is most likely to become a hub in case any disaster occurs in Asia.

Inquiry regarding this matter
Contact person: Representative Director Munetoshi Kondo
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E-mail address: contact@sakigakejp.com

12. Suppression of water damage and heat island phenomenon by water retaining materials using coal ash

KURINKA CORPORATION http://kurinka.com/index.html

Challenges addressed | ③Floods, heavy rain & typhoons, ④Extreme temperature changes

Adaptation Challenge Frequent heavy rains and slope disasters pose challenges in developing countries where adequate countermeasures have not been implemented. Global warming and rapid urbanization have also made it necessary to address the heat island effect.

Contribution The Kurinka Road construction method, which uses pavement materials made from coal ash, contributes to the control of internal flooding and the heat island phenomenon through its rainwater permeability and water retention effect.

Project Detail

Country | Malaysia, etc.

■ Background

In Malaysia, where heavy rainfall caused by the monsoon and climate change has led to heavy precipitation, flood control is an urgent issue. In 2015, Kurikuka, which has the Kurikuka Road method of permeating and retaining rainwater, signed a memorandum of understanding with a Malaysian engineering company for the development and technology transfer of a Malaysian version of the Kurikuka Road. Malaysia has a high dependency on coal-fired power generation, and has successfully demonstrated a method of manufacturing paving materials using coal ash emitted in the process of power generation, which is normally disposed of in landfills.

Countries in Southeast Asia have similar challenges, and patents have been granted in Malaysia, Vietnam and Indonesia. In Vietnam, the production of a prototype using local coal ash has been completed, and the demonstration will proceed in the future.

■ Challenges and Responses in Business Expansion

Instruction is given on how to manufacture water-retaining materials from raw materials derived from local coal ash and other wastes. However, since the percentage of surface area and particle shape as porous materials with superabsorbency are different depending on the wastes, it is necessary to determine the difference while manufacturing. It is instructing local residents to learn the difference in the properties of each raw material as know-how.

■ Key Success Factors

In Malaysia, where the high water retention capacity of the Kurinka Road and measures against internal flooding have become an issue, supply and demand have matched, leading to the development of business.

Kurinka is also responding to further needs by developing the SARD (Stormwater Absorb and Runoff Delay) method, which enables the preservation of mountain ecosystems in addition to urban flood countermeasures.

▲Demonstration work at Melaka City Council Recreational Park

Related SDGs

■ Business Model of the Project

Kurinka is developing a technology-transfer licensing business in which it dispatches two to three engineers to the site to provide guidance on everything from material production to construction. After the know-how is transferred, the local partner is left in charge and advice is provided as needed.

Product & Technology

Kurinka Road Pavement: The pavement is made of coal ash and consists of two layers: a permeable layer and a water-retaining layer. By applying the Kurinka Road Method, which has water permeability and water retention effects, to road surfaces, urban flood damage can be suppressed through its rainwater runoff control effect, and the heat island phenomenon can also be suppressed through its water retention effect.

The method can also be applied to a slope using only a water-holding layer, and contributes to the control of topsoil runoff while exerting recharge action by gently infiltrating rainwater.

SARD method: Porous materials such as coal ash are packed in sandbags and placed on slopes to provide surface water slowing, reducing, and dispersing functions, which is effective in controlling topsoil runoff. It also contributes to the control of rapid ground infiltration of surface water that induces slope disasters. Controlling surface water runoff and controlling surface soil runoff is one of the conditions for vegetation to flourish. This method is also a green carbon technology that helps preserve and restore the ecosystem. In a domestic demonstration test, this method was found to be effective in preventing sediment runoff during heavy rainfall, and at the same time, vegetation recovery was confirmed. In addition to coal ash, biomass ash and volcanic ash have also been shown to have water permeability and water retention effects.

▲SARD method mounting work (green: volcanic ash, red: coal ash)

▲Comparison of SARD method mounted area and non-mounted area

Challenges for Further Development

Demonstrations will be started in Vietnam, where a prototype has already been created, and business will be promoted. In addition to the Kurinka Road, the Company will promote overseas development in Southeast Asia and other countries where the need for the Kurinka technology is expected, such as by contributing to the control of surface water and topsoil runoff and to the restoration and conservation of ecosystems as a green carbon technology through the deployment of the SARD method.

Profile of Project Company

Established in 2009. It has the manufacturing technology of environment-friendly multifunctional pavement which enables the suppression of urban flood damage and heat island phenomenon by the permeation and water retention effect of rainwater and the preservation of ecosystem using coal ash. Patents have been obtained for pavement structure and construction method using coal ash and slope maintenance method using coal ash. In 2018, it was awarded by METI Ministry of Economy, Trade and Industry as one of the 300 Vibrant Small and Medium Enterprises.The company is now expanding its business into East and Southeast Asia, taking advantage of the knowledge it has accumulated in Japan.

Inquiry regarding this matter
Contact person: KURINKA CORPORATION, President and Representative Director, Shinichi Baiki
E-mail address: s_umeki@kurinka.com

13. Preventing Slope Hazards with Erosion Control Mats

Takino Filter Inc. http://takino.co.jp/

Challenges addressed | ③Floods, heavy rain & typhoons

Adaptation Challenge Across a spread of countries, the number of slope disasters caused by the climate change is increasing. The disasters inflicts severe damage not only on our life and properties, but also on inflastructures and our economic activity.On the other hand, as developing countries are undergoing rapid development, slope protection has also become urgent issue at construction sites.

Contribution Takino Filter Inc. attaches seeds to mats that have the function of slope erosion prevention. It realizes slope protection by erosion preventing function of the mats and at the same time by soil conservation ability of plants in revegetation. Those are their original products called Erosion Control Mats.

Project Detail

■ Background

Country | Indonesia, Philippines

In Indonesia, where countermeasures against slope disasters caused by torrential rains had become an issue, JICA's project feasibility study and dissemination demonstration project were utilized to conduct test construction of a Erosion Control Mat with the function of suppressing erosion during rainfall. The results were favorable, and the product has been adopted in an industrial park and is being exported.

Currently, Takino Filter Inc. is conducting a demonstration project in the Philippines, where rainfall is higher and temperatures are warmer than in Japan, and by adopting highly adaptable plants, greening has been realized more quickly than initially expected. The local Department of Public Works and Highways (DPWH) has highly evaluated the demonstration results, and in the future, seminars will be held for engineers in various regions of the Philippines to deepen awareness of slope disaster prevention technology.

■ Challenges and Responses in Business Expansion

Initially, Takino Filter Inc. considered manufacturing products locally in consideration of adaptability, but the risk of technology outflow was pointed out. Therefore, in developing business in the Philippines, Takino Filter Inc. is considering developing a business in which the base part of mat, which is the fundamental technology, is manufactured in Japan, and the process from seed attachment onward is implemented locally.

■ Key Success Factors

While awareness of disasters is increasing in many countries due to the occurrence of localized heavy rains caused by climate change, developing countries lack sufficient technologies for preventing and restoring slope disasters.

Under such circumstances, the unique technology of the Erosion Control Mat, which differs from general methods such as slope revegetation and erosion prevention technology using resin products, has been highly evaluated.
Therefore, Takino Filter Inc. was able to collaborate with partner companies that is actively engaged in sales activities.

▲Vegetation situation after 3 months of pilot construction (the situation immediately after construction is shown in the lower right)

Related SDGs

■ Business Model of theProject

The primary processing of the mat part, which is the main technology, will be carried out in Japan, and the partner company will carry out the secondary processing by attaching seeds that match the local vegetation and sales activities in order that the Erosion Control Mats can be adopted for public works.

Product & Technology

Erosion Control Mats: This product has the function of protecting the slope by installing a mat and increasing the protection effect by revegetation. In case that conventional mats are installed and seeding is done separately, the effect of slope protection is not expected until the plants grow enough.

With a Erosion Control Mat, however, the mat itself has an erosion-preventing function, and its erosion-preventing function is demonstrated on the day of installation, even in the season when the plants do not grow. The seeds under the mats will be protected until the environment is suitable for their growth, and when the plants spread roots underground, the effect of slope erosion prevention will be enhanced with accompanying the greening.

The non-woven fabric used in the mats adheres closely to the soil, preventing erosion even in heavy rainfalls of 100 mm per hour immediately after installation, and the greening further increases strength, enabling maintenance-free slope protection.

▲Mat products containing local seeds intended for certification in the Philippines

Challenges for Further Development

Takino Filter Inc. aims to have its Erosion Control Mat adopted in public works projects in the Philippines, but in order for them to be adopted, certification must be obtained. During a demonstration experiment conducted by JICA, this product should obtain a conditional approval from DPWH (Department of Public Works and Highways).In addition, local partners will conduct sales activities and after-sales service to build up a track record and credibility, and promote full-scale business development throughout the Philippines.

Profile of Project Company

Established in 1994 as a venture company through joint industry-government-academia collaboration. Takino Filter Inc. is engaged in research, manufacturing, and sales of slope protection materials and environmental materials. With the concept of "restoration of the natural environment," the company promotes the use of Erosion Control Mats that prevent soil erosion, realize greening, and restore the natural ecosystem, as well as developing new environmental materials. In 2018, the company launched its International Business Department to conduct sales activities for full-scale overseas business development.

Inquiry regarding this matter
Contact person: Takino Filter Inc., International Business Division, Sales Division, Tsunemura & Kodama,
Phone: +81-833-46-4466
E-mail address: takino-info@takino.co.jp

14. Reducing Flood Damage with Plastic Rainwater Harvesting Structures

Chichibu Chemical Co., Ltd. https://www.titibu.co.jp/index.html

Challenges addressed | ②Droughts. ③Floods, heavy rain & typhoons, ⑤Water insecurity

Adaptation Challenge Extreme weather conditions are causing flooding damage due to heavy rains and water shortages due to droughts are becoming more serious.

Contribution Chichibu Chemical Co. Ltd, contributes to resolving social problems such as reducing flood damages caused by heavy rains and water shortage by utilizing stored rainwater by research, development and selling of plastic Plastic Rainwater Storage Structure (PRSS).

Project Detail

Country | Thailand, Indonesia, etc.

■ Background

Chichibu Chemical, which has around 15% share; No.1 in manufacturing and selling of plastic Plastic Rainwater Storage Structure (PRSS) among small and medium-sized companies in Japan, is expanding business to Southeast Asia, where the effects of climate change and flooding caused by heavy rains are becoming serious problems. When expanding business, they introduced PRSS in Indonesia through JICA's PoC project, and in 2017, the company began its expansion in Thailand, also through JICA's project. The PRSS installed in an industrial park in Bangkok, which stores 300 tons of rainwater, was the first PRSS delivered in Thailand and attracted a great deal of attention from the local community. The project's monitoring showed good results, which resulted in being adopted as the PoC project for Bangkok Metropolitan Administration too, which they installed small-scale of 80 tons. Followed by a large-scale project in a park in the Bangkok Metropolitan Administration.

Chichibu Chemical is aiming to further expand business in Thailand, as PRSS is also included in the Bangkok Metropolitan Administration's Master Plan until 2030, which encouraged sales activities as well as increased the interest from private companies.

■ Challenges and Responses in Business Expansion

In Indonesia, where PRSS was introduced through a JICA project, while it was highly valued by the local people for its effective result in reducing flooding, it did not lead to commercialization due to the government not having sufficient budget for infrastructure. However, the company still continuous to communicate, and has established a good relationship with the local government so that they can roll out to Indonesia again when the budget for flooding risk countermeasures has been secured.

■ Key Success Factors

In addition to the fact that Chichibu Chemical's technology had been certified by the Association for Rainwater Storage and Infiltration Technology, an affiliated organization of the Ministry of Land, Infrastructure, Transport and Tourism, developing products which adapts to the Thai temperature and environment, aiming to expand business Southeast Asia, has led to the first PRSS delivery case in Thailand.

▲Thai Industrial Park appearance of construction

Related SDGs

■ Business Model of the Project

In addition to the project adopted by JICA, a local agency receives the order with the budget of Bangkok Metropolitan Administration, and Chichibu Chemical provides PRSS export and construction guidance.

Product & Technology

New Plastic Rainwater Storage Structure (PRSS) "Nu-Pura-Kun": This product contributes to reducing flood damage by creating an underground rainwater storage space. It is made by plastic material which weighs only about 3 kg, and its shape which eliminates joint parts, makes assembly work easier and less expensive than concrete Storage Tank. Additionally, the product is high strength which makes it possible to install under a parking lot. After installation, the inflow tank only needs to be inspected and cleaned once or twice a year for sustainable use. The rainwaters are most commonly used as grey-water, but by installing a filtration system, it can also be used as daily usage water.

Currently, a PoC project is on-going in Japan to realize IoT PRSS business. Conventional PRSS had to be installed for each purpose to control rainwater runoff and to utilize rainwater. However with IoT, stored water can be discharged in advance based on rainfall forecasts, making it possible to serve both purposes with a single PRSS. After the PoC in Japan, the IoT PRSS will also be rolled out to overseas as well.

▲Installation in the park

▲NEUPLA KUN BODY

Challenges for Further Development

The company is currently discussing with a plastic molding factory in Thailand to switch from domestic manufacturing and export to manufacturing in Thailand in the future, so that they can reduce cost and stabilize supply at the same time. After establishing a local manufacturing system, the company is considering exporting PRSS from Thailand to neighboring countries, and is currently conducting market research in Vietnam.

Profile of Project Company

Established in 1990 to manufacture and sell civil engineering and construction materials and fertilizers, the company develops, manufactures, and sells PRSS and accessories. The company boasts the largest market share among small and medium-sized enterprises in Japan, approximately 15%, and is currently actively expanding its overseas business. Especially in Thai, not only have they installed the first PRSS in the country, but they have been mentioned in the Bangkok Metropolitan Administration's Master Plan etc. and continue to receive orders, the interests from private companies are also growing. In 2023, the company received the 6th Japan Construction International Award Commendation by the Minister of Land, Infrastructure, Transport and Tourism of Japan.

Inquiry regarding this matter
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15. Introducing a resilient hybrid renewable energy power generation control system against environmental changes

Kyudenko Corporation http://www.kyudenko.co.jp/

Challenges Addressed | ③ Floods, heavy rain & typhoons, ④ Extreme temperature changes

Adaptation Challenge Power supply in remote islands and areas is often dependent on regional grids through diesel generators due to a lack of main power transmission network and therefore the power supply is not stable and chronically tight. In addition, remote islands are highly vulnerable to natural disasters on account of geographical characteristics. To counter these issues, it is imperative for them to be equipped with a resilient electric power system against diverse weather conditions.

Contribution Kyudenko's hybrid power generation control system is a management system (EMS) that autonomously stabilizes and supplies electricity from unstable renewable energy sources such as solar and wind power generation. By optimizing power control on the renewable energy generation side, the system can respond to increases and decreases in power demand and drastic changes in weather and other environmental conditions, stated as an adaptive measure in the energy supply field.

Project Detail

■ Background

Country | Indonesia

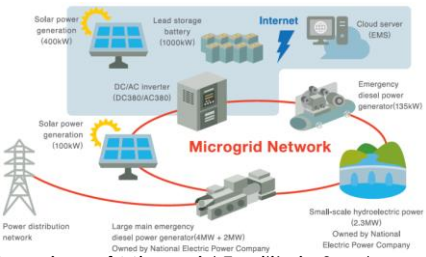
On the island of Sumba in eastern Indonesia, the country's Agency for the Evaluation and Application of Technology = BPPT (then/now BRIN) was conducting an experiment to stabilize renewable energy on a remote island, and it has decided to add Kyudenko's EMS technology to this experiment. In 2016, the project was selected by the Ministry of the Environment for a three-year demonstration project. In this demonstration, the company achieved continuous transmission of electricity from renewable energy sources to the regional grid with stable waveforms. Based on this experience, in FY2020, when overseas projects were difficult due to the Corona disaster, the company proposed the application of this EMS technology to public facilities in Japan for resilience (strengthening disaster prevention projects). The system was adopted by the Ogi City Hall in Saga Prefecture and was the first in Japan to achieve resilience by using almost 100% renewable energy to power all functions of a government building. Based on this experience, the New Energy and Industrial Technology Development Organization (NEDO) has adopted the "International Demonstration Project for Japanese Technologies Contributing to Efficient Energy Consumption, etc.: Study on Conformity with Demonstration Requirements, etc." with the aim of supplying 100% renewable energy to remote islands in Indonesia in collaboration with the Indonesian government and is now in full-scale implementation. The project has been adopted by NEDO (New Energy and Industrial Technology Development Organization) as a "Study on the Conformity with Demonstration Requirements for International Demonstration Projects of Japanese Technologies that Contribute to Energy Consumption Efficiency, etc." and is now moving into the full-scale project phase.

■ Challenges and Responses in Business Expansion

Since this was a public-private partnership between the Indonesian government, the Japanese government (Ministry of Environment), and Japanese companies, it took time to coordinate and negotiate the renovation of state-owned assets in the partner country, but the project was successful because officials from the partner country were able to visit the demonstration facility in Japan and experience the benefits of its introduction beforehand.

■ Key Success Factors

The demonstrations to the government of the partner country the tangible benefits of the introduction of the system, such as a stable supply of electricity to the region played a significant roles.



▲Overview of Microgrid Facility in Sumba Island, Indonesia

Related SDGs

■ Business Model of the Project

An EPC project is being established, where Engineering, Procurement and Construction are carried out by a local entity upon order from power companies. Additionally, looking ahead to the IPP (Independent Power Producer) business in the future, the company is conducting a feasibility study to introduce biomass-solar hybrid power generation facilities on several remote islands in Indonesia.

Product & Technology

By introducing EMS where technologies for the generation and storage of renewable energy power are remotely controlled, a self-sustained and stable power supply is ensured for certain duration of time and at certain volume. In addition, power generation and weather data will be accumulated, and O&M (operation and maintenance) methods will be established. The energy storage system uses lead-acid batteries, which have a disadvantage in terms of weight, but have a long discharge time. The system is designed to provide a stable supply of electricity to the regional mini-grid, etc., not only for a limited period during the day, but for 24 hours a day. Currently, models of grid-connected power sales using large storage batteries are in widespread use, while this model is distinct from other technologies in the sense that it places the highest priority on maintaining a 24-hour power supply to the local community or target facility. In the future, the goal is to use this technology as the basis for local power supply solely from renewable energy sources, without the need for internal combustion power generation.

Challenges for Further Development

The Indonesian government is seriously focusing on renewable energy in remote islands and remote areas scattered throughout the country to achieve carbon neutrality for the country. MHI will continue to promote the benefits of decarbonization through the introduction of Japanese technology to the Indonesian government and will take on challenges regardless of the type of business, such as construction orders and IPP projects. The biggest challenge in making renewable energy a key source of electricity is "securing a stable power generation source. It is unrealistic to rely solely on unstable power sources such as solar power for local power supply, as it would increase the weight on storage batteries. It is necessary to secure power sources such as biomass power generation and small-scale hydroelectric power generation that can generate power continuously 24 hours a day, and then build a value chain of renewable energy based on a "local production for local consumption" model. We intend to build a model that takes advantage of the unique characteristics of each region.

Profile of Project Company

Kyudenko Corporation was established in 1944. A general equipment company that handles electrical work, air conditioning and plumbing installation, as well as power distribution line work. Headquartered in Fukuoka City. In 2022, the company established the Green Innovation Business Division to further strengthen its technological proposals that contribute to carbon neutrality in Japan and overseas. In overseas operations, the company has established bases in Singapore, Thailand, Malaysia, Vietnam, Taiwan, Indonesia, and other countries. The resilience project for the Ogi City Hall in Saga Prefecture won the Chairman's Award of the New Energy Foundation in 2022 (jointly with Ogi City and others) of the New Energy Grand Prize sponsored by the Ministry of Economy, Trade, and Industry.

16. Greater resilience in anti-disaster infrastructure through the world's first "Typhoon Power Generation" and communications satellite

Challenergy Inc. https://challenergy.com/

Challenges Addressed | ③ Floods, heavy rain & typhoons

Adaptation Challenge The Philippines, an island country in the Southwestern Pacific, is one of the most vulnerable countries to climate change, experiencing severe typhoons every year. In remote islands, delays in dissemination of disaster information and disaster recovery is a serious issue coupled with power supply and communications shutdowns after typhoons.

Contribution Challenergy's business development combining wind turbines and satellite communications as an adaptation of the energy and telecommunications sector.

Project Detail

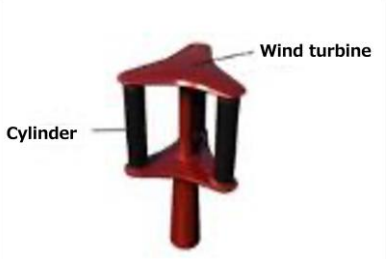
■ Background

Country | Philippines

Challenergy Inc. has, since its inception targeted island countries in the Pacific where severe typhoon damage is/will be feared due to climate change, and mountainous countries where installation of the conventional wind power generators is difficult. In 2018, the Company launched field tests of its 10kW prototype in the Ishigaki Island, Okinawa prefecture. In 2017, a feasibility study in the Philippines in collaboration with SKY Perfect JSAT Corporation under the "Climate Change Adaptation Effect Visualization Project" funded by the Ministry of Economy, Trade and Industry of Japan (METI) in 2017 was conducted. A joint venture company in the Philippines was launched in January 2019. Technology demonstration in Batanes Island, the north-most island of the country,has started in 2021. As of now, the 10kW models has begun mass production and is on sale. The company is continuing its research and development, including the launch of a small wind turbine generator in 2023 that can be transported to areas where logistics networks are not yet developed, and aims to complete a 100kW generator in 2025.

■ Challenges and Responses in Business Expansion

The challenge is that it takes time for infrastructure projects to be established as a business, but external support such as subsidies for new technologies has not been sufficiently developed. Therefore, they are currently developing their business through self-help efforts to raise funds through equity.



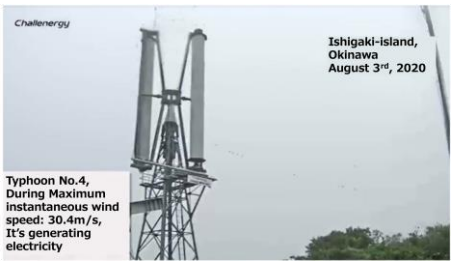
▲ Vertical-axis Magnus wind turbine

■ Key Success Factors

The project is mainly targeted at countries and regions with weak power and telecommunication infrastructures and will provide continuous telecommunication services to digital divide areas even after disasters by combining "vertical-axis Magnus-type wind turbines," which are highly resilient to disasters and have low cost and environmental impact, with satellite communications. The company is developing its business in partnership with the following companiesJoint venture partner in the

・Philippines: PMR Prime Development Corporation

・Sales partners: National Power Company, National Oil Corporation's renewable energy division, real estate development companies in the Philippines, etc.

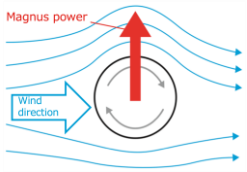


▲Generated power at 30.4 m/s peak wind speed

Related SDGs

Product & Technology

Magnus x Vertical Axis Wind Turbine (Challenergy): The product rotates using the "Magnus force" generated at the time of turbine rotation in the currents, as opposed to the conventional "Horizontal Axis Propeller Style" widespread in other areas, especially Europe. The turbine rotates even with mild wind and will not over-rotate even with typhoon and thus the turbine achieves the wind speed suitable for power generation. Power can be generated with wind from all directions. Magnus turbine is capable of producing power in times of strong or turbulent wind, leading to low failure rate, thereby improving capacity utilization rate.



▲ Magnus force mechanism

▲10kW demonstration unit

(Batan Island, Philippines)

Micro Wind Turbine Type D : As a small wind turbine generator without a propeller, its unique patent-pending shape enables both power generation performance and durability. In addition, the simple structure facilitates transportation and repair. This makes it possible to deploy wind turbines in areas where it would have been difficult to introduce them in the past, such as areas prone to typhoons and other disasters, and areas where logistics networks are not well developed.

Micro Wind Power Generator for Cold Climate Type A: Special paint is used on the wind turbine body to prevent icing on the wind turbine body. Since the wind turbine rotates at a lower speed than a propeller wind turbine, it is less likely to cause ice slow phenomenon, and can be installed in any location, even in cold climates.

▲ Next generation micro wind turbine "Type D"

(Setagaya-ku, Tokyo)

▲ Type A" micro wind turbine for cold regions (Rokkasho Village, Aomori Prefecture)

Challenges for Further Development

The company is considering contributing to countries other than the Philippines by providing a stable supply of electricity through the utilization of unused resources such as typhoons, etc. However, the product price is higher than that of conventional generators, so visualizing the life cycle cost advantage is a challenge. The technology will be marketed overseas as a package of energy and communication services in consideration of limited public funds for disaster-related services.

Profile of Project Company

Challenergy Inc. was founded in 2014 as a start-up under the vision of "Innovating wind power generation for supply of safe and secure electricity for all humans". The company is developing the "Magnus x Vertical Axis Wind Turbine" - a wind turbine without propellers, which can withstand and harness the power of typhoons. The company was selected as a "J-Startup" company in 2018, which is a support program for Japanese startup under METI. They exhibited their technology in the Japan Pavilion during the COP 24 (2018) and 25 (2019) as an innovative measure of adaptation and mitigation. The project was also introduced in the G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth in Karuizawa, Japan in 2019. As of now, the 10kW models has begun mass production and is on sale. The 100kW models is scheduled for sale in 2025.

Inquiry regarding this matter
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17. Mitigating damage to energy supply system in times of disasters

Panasonic Holdings Corporation https://holdings.panasonic/global/

Challenges Addressed | ③ Floods, heavy rain & typhoons, ⑩ Economic loss & livelihood failure

Adaptation Challenge Increase in natural disasters associated with climate change affects people's lives significantly by damaging energy infrastructure, destabilizing supply network, and obstructing educational and medical activities.

Contribution Panasonic offers the Solar Lantern (Solar LED Light), a stand-alone power source that utilizes renewable energy with minimal impact on the environment. Solving the issue of people's health and livelihood threatened by the unavailability of electricity is an adaptive measure in the energy sector.

Project Detail

Country | Indonesia, Myanmar, etc.

■ Background

In 2006, then Uganda's Minister of State for the Vice President's Office visited Japan and toured the Company's solar facility (Solar Ark by SANYO), leading to the request from the Vice President for cooperation later on. Research and development was launched using its unique strength of energy storage and energy generation technology now known as "Solar Lanterns". The Company commenced "100 Thousand Solar Lanterns Project" in February 2013 aiming at donating 100 thousand solar lanterns to developing countries by 2018 when the Company marks its 100th anniversary. Since the project's inception, a total of 102,716 solar lanterns have been donated to 30 countries of regions mainly in Asia and Africa. Since 2018, the Company has continued to donate light to non-electrified community through "LIGHT UP THE FUTURE" Project, that took over the "100 Thousand Solar Lanterns Project". In Indonesia, with the grassroots grant cooperation of the Embassy of Japan in Indonesia, "power supply containers" were installed in schools on remote islands to support children's learning opportunities.

■ Challenges and Responses in Business Expansion

Asia and Africa, the two main regions without electricity, have different temperatures and humidity, and there was a need to dispel the image that solar lanterns break down easily. To provide a high-quality product while keeping costs down, the company developed a solar lantern that would be accepted in both Asia and Africa, considering the greatest common denominator of each region with respect to climate, cord length, and other factors that differ between the two. In addition to poverty, which is an issue for regions without electricity, the company also approached Japanese international organizations and governments from an environmental perspective to find overseas partners.

■ Key Success Factors

With an emphasis on knowing the local market, the company have succeeded in developing a relatively inexpensive, high-quality solar lantern that meets local needs and is acceptable in both Asia and Africa.

Related SDGs

■ Business Model of the Project

We provide solar lanterns as an activity tool for international organizations and NGOs that are implementing programs to create opportunities to increase income, especially in Asia and Africa, where there are concerns about the impact of increased disasters due to climate change on the living environment of residents. In cooperation with international organizations and NGOs, we estimate how many solar lanterns are needed for purposes such as operating night schools and night clinics and determine the number of lanterns to be provided in consideration of our company's budget.

Product & Technology

To meet the needs of areas without electricity, the company offers solar lanterns (solar LED lights) with improved brightness and affordability for low-income people. Considering local conditions where batteries are difficult to replace, the solar lantern is solar-powered and does not require battery replacement, and by adding a function that allows the illumination level to be changed, a single unit can be used in various aspects of daily life. The product also reflects local needs in non-electrified areas by providing a function to charge cell phones, which are indispensable for communication and payment in these areas.

▲Solar lanterns

▲Light utilized for nighttime learning (Myanmar)

Challenges for Further Development

Continue to donate lights to areas without electrification by considering the development of dissemination in collaboration with local partners such as international organizations and NGOs that are developing programs that enable bulk sales, and with a view to collaborating with public funding schemes.

Profile of Project Company

Panasonic Holdings Corporation was founded in Osaka in 1918 by Konosuke Matsushita, upholding the philosophy of extending life with easy access to electricity throughout the world. Since then the Company has taken on a wide range of initiatives. The Company has encouraged adaptation efforts as part of its project in alleviating the impact of climate change through its products, services and solutions while providing support for the growth of business activities under its CSR commitments including this project based on its corporate philosophy, “Make contributions to the progress of society and the well-being of people through our business activities" which has been committed since its foundation. The Company won the Good Design Award 2013, IAUD Silver Award 2013 under Social Design Category and iF Product Design Award 2014 for its Solar Lanterns and the Good Design Award 2015 for its Solar Storage.

18. Generating energy and farming at one place with Solar Farm® technology

Farmdo Group https://farmdo.com/farmland.html

Challenges Addressed | ⑥ Food insecurity

Adaptation Challenge In the agricultural sector, climate change causes (1) production instability, (2) shifting of suitable production areas, (3) soil degradation due to flooding and salinity increase, (4) water shortage, etc.

Contribution Farmdo supports the adaptation to climate change by deploying the Solar Farm® technology internationally which was developed in Japan. For its Mongolia project, Farmdo conducts training in Japan and locally for agricultural workers, including many women, to improve their skills in ag-tech. Farmdo also contributes to the capacity building of local people through regular technical training on the operation of solar power plants.

Project Detail

Country | Mongolia, Chile, Kenya

■ Background

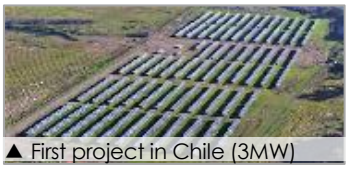
Farmland, a member of the Farmland Group, owns about 210 solar power plants, of which about 80 are solar farms. Overseas, the company is practicing solar power generation in Mongolia, and is currently conducting demonstration tests in Chile in collaboration with the Ministry of Agriculture and Irrigation, with plans to expand overseas.

【Mongolia】 Established a joint venture in FY2013, conducted JICA's 5th Preparatory Survey for Cooperation (Promotion of BOP Business Collaboration), was selected for the JCM equipment subsidy project twice in FY2015 and FY2016, and started selling electricity in FY2017. Operating a solar farm with a total area of 28 ha and 10.4 MW.

【Chile】 Established a joint venture in 2019 and started selling electricity in June 2021; four 15 MW solar farms were selected by 2022, and all construction is scheduled to be completed by May 2024; the largest 26.3 MW + 48 MWh battery storage project was selected in 2023, and the project is scheduled to start in March 2024 with construction to be completed in 2025.

【Kenya】 In September 2022, a photovoltaic (220kW) storage battery system was adopted by UNIDO and installed for a rose production and export company in Kenya.


▲ Mongolia Monnaran 10.4MW Power Plant and Solar Farm®.


▲ First project in Chile (3MW)


▲ Second project in Chile (3MW)


▲ Third project in Chile (3MW)

■ Challenges and Responses in Business Expansion

In overseas expansion, local partners are important. In Mongolia, they were able to introduce Solar Farm® by leveraging our existing network of contacts and utilizing JICA's research projects to solve local issues.

■ Business Model of the Project

Farmdo Group will invest and transfer technology via education and training, and develop solar PV sites with value-added agricultural practices. The profit is distributed to the farmers and local communities.

▲ Farmland Chile Project

Related SDGs

■ Key Success Factors

The following factors have been successful in Japan, and it is suggested these factors are also effective overseas

・Sustainable system that contributes to local economy by local production for consumption

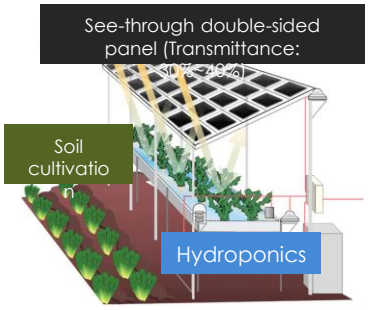
・Technology for producing vegetables with high added value such as safety, freshness, and taste along with efficient sales channels (40 stores in Tokyo metro and Gunma Prefecture)

・Deep commitment to project implementation by empowering the local population through the creation of local jobs and education and training opportunities, and by investing in the company itself.

▲Mongolia 10.4MW power plant

Product & Technology

Solar Farm® is a "new form of agriculture" developed by Farmdo, as a farm-type solar power plant that combines agriculture and solar generation. It is a business model promotes local production for local consumption, production and sales of agricultural products, and improving the food self-sufficiency rate. Farmdo is incorporating bifacial solar panels to maximize the amount of power generation, while maintaining appropriate light transmittance. By using IoT and sensors, farm management can adapt to climate change and various regions. Hydroponics is effective for both water-saving agriculture and in areas where topsoil was lost due to heavy rainfall or where salt damage has occurred. Additionally, Farmdo is implementing labor-saving farming methods that combine drip irrigation, a coco-peat medium (solar grow bag), and weed control sheets, which the company plans to spread overseas.



▲coconut shell medium

▲ waterlogged elevated cultibvation

▲ soil cultivation

▲20kW pilot farm solar farm supported by Ministry of Agriculture in Chile

Challenges for Further Development

Since agriculture is subject to high price fluctuation risk, the establishment of a price-competitive cultivation management system under local climatic conditions and climate change, and the establishment of a business model with investment partners on a case-by-case basis for the diffusion of solar farms are issues to be addressed for further diffusion and development.

Profile of Project Company

Founded in 1994. Under the umbrella of Farmdo Group are Farmdo Co., Ltd. (sales of agricultural products and materials), Farm Club Co., Ltd. (production and sales of agricultural products and agro-tourism), Farmland Co., Ltd. (development of solar power generation and Solar Farm®). The group corporate philosophy is to contribute to improving the income of farmers through integrated group management. In 2013, 2019 and 2022 respectively, subsidiaries established in Mongolia, Chile and Kenya. In particular, Farmdo aims to support adaptation to climate change using solar farms overseas for which patents have been obtained in Japan, the United States, China, and Taiwan. In 2013, Farmdo was selected by the Ministry of Economy, Trade and Industry as a driving company for the regional future. Representative Iwai was awarded the Order of Mongolia in 2017, and his efforts were featured in the 2019 edition of the 2021 White Paper on the Environment. Utilizing the bilateral credit system, the company is developing solar farms in Mongolia, Chile, and Kenya, with the goal of expanding to 10 countries and 30 locations in the world in 20 years.

Inquiry regarding this matter
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19. Improvement of Productivity and Income of Agricultural and Fishery Workers by Introducing Solar Sharing

Agritree Co., Ltd. https://www.agritree.jp/

Challenges Addressed | ② Droughts, ⑥ Food insecurity

Adaptation Challenge The increasing damage to crops due to drought and rising temperatures caused by the impact of climate change, coupled with the soaring electricity prices, pose challenges for the operational costs and risk of shutdowns of agricultural production, processing, and storage facilities.

Contribution Agritree supports the establishment of a system that can provide a stable supply of electricity for the agriculture and aquaculture industries through the implementation of solar sharing. This contributes to ensuring a stable food supply.

Project Detail

Country | Vietnam

■ Background

In Vietnam, high electricity prices and power outages during disasters have destabilized the management of agricultural and acuacultural workers. Rising temperatures are also causing more damage to crops. Agritree has a long record of supporting the introduction of solar sharing in Japan, and has contributed to raising the income of agricultural workers by implementing solar sharing, which potentially improves agricultural productivity by preventing leaf scorch with installed solar panels and improving soil water retention capacity. In 2023, Agritree's survey proposal was selected by JICA as a business development demonstration project, and it has started to contribute to solving problems in the field of agriculture and aquaculture in Vietnam by utilizing its achievements in Japan. Since the environment and legal systems of the agricultural and aquacultural industries are different between Japan and Vietnam, the demonstration project will be conducted by the fall of 2024 to establish a system that supports the introduction of solar sharing and to design a demonstration facility. After the project, the company aims to develop a full-scale solar sharing business in order to contribute to stabilizing the management of agricultural and aquacultural workers.

■ Challenges and Responses in Business Expansion

Due to differences in agricultural environments such as sunlight hours, natural disaster risks, agricultural practices, and regulations related to the power industry, it is necessary to develop the design and business model of solar sharing that is suitable for Vietnam. Through collaboration with institutions such as Vietnam National University of Agriculture and Can Tho University, data on crop cultivation, aquaculture, and power generation under solar sharing facilities will be collected. The aim is to promote the widespread adoption of solar sharing in Vietnam, which allows for the simultaneous production of electricity and agricultural/aquacutural products.

■ Key Success Factors

Based on the belief that enhancing the sustainability of agriculture is of utmost importance in introducing solar sharing, a system has been established to distribute the revenue from power generation among the power generator, landowner, and agricultural and aquacutural workers involved. By accumulating achievements domestically, a solid foundation has been built for expanding overseas.

▲Solar sharing facility

Related SDGs

■ Business Model of the Project

Agritree sells solar sharing facilities to larger agricultural and aquacultural production companies and trading firms. The facilities are intended to be installed on the agricultural land and aquaculture facilities of small-scale producers who sell their products to these larger entities. Currently, Agritree is considering an on-site consumption model where the generated electricity is used by the small-scale producers and neighboring production and processing facilities. However, in the future, if there are changes to Vietnam's power system regulations, Agritree may explore off-site power sales contracts to supply electricity to remote areas.

Product & Technology

Solar Sharing: The Solar Sharing involves constructing a 3m high trestle on farmland and installing thin photovoltaic panels at intervals to simultaneously produce crops and electricity. Although the installation of solar panels reduces solar radiation by about 30%, it has been confirmed in Japan that the growth of over 50 agricultural crop varieties is not affected as long as the shading ratio is limited to around 35%. Additionally, the thin panels partially block strong sunlight, preventing leaf scorch while still allowing sufficient sunlight, and reducing water evaporation in the soil, thereby improving water retention and potentially enhancing crop productivity.

Currently, solar sharing is primarily installed on agricultural land, but it is also being considered for use in the aquacultural industry. Vietnam, for example, is exploring the application of solar sharing in shrimp farming. In a demonstration experiment with Can Tho University, the aim is to verify whether solar sharing can reduce the cost of aquaculture by replacing traditional shading nets used for controlling water temperature in aquaculture ponds and using the generated electricity as a power source for pumps and other equipment.

▼Left: Experimental paddy field at Vietnam National University of Agriculture. Right: Shrimp farming test facility at Can Tho University (both scheduled for construction of demonstration facilities in 2024)

Challenges for Further Development

Utilizing JICA's business development demonstration project, they aim to develop full-scale business development in Vietnam by promoting cooperation with Vietnam National Agricultural University and Can Tho University. The company is also considering expanding the solar sharing system to arid areas in India and desert areas in Africa, as it can improve soil water retention. Since solar sharing is installed on agricultural land, of which primary purpose of use is for food production, verification of the legal system and consultation with national governments are issues when it is deployed to countries.

Profile of Project Company

Established in 2018. To realize a future where food and energy can be passed on safely to the next generation, the company supports the introduction, design, procure materials, construct, and maintain solar power generation, including solar sharing, launch and operate regional energy projects, and conduct agriculture that does not use pesticides or chemical fertilizers. In 2018, the company received the JXTG Group Accelerator Program Excellence Award. Since 2021, the company has started studying the feasibility of commercialization in Vietnam through JICA's desktop research project and the Ministry of the Environment's city-to-city cooperation projects. The company is working to develop a solid business plan for Vietnam, aiming to establish a local subsidiary in 2024 and start demonstration experiments and marketing in 2025.

Inquiry regarding this matter
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20. Greater harvest through compost soil improver

Kawashima Co., Ltd. http://www.kawashima.jp/

Challenges Addressed | ② Droughts, ⑥ Food insecurity

Adaptation Challenge Aggravating water shortage due to increasing incidents of drought has wreaked havoc on agricultural production and led to the decline of self-sufficiency ratio of the country's food supply. Many developing countries where much of the working population consists of farmers are under vulnerable environment and it is an urgent socio-political issue to raise the agricultural productivity.

Contribution Through introducing Kawashima Co., Ltd.'s compost plants and assisting the establishment of an organic fertilizer supply system by producing high-quality compost processed from household waste and agricultural waste materials, will bounce the harvest while improving soil conditions and ultimately solve the issues surrounding food security and poverty.

Project Detail

■ Background

Country | Sri Lanka

Sri Lanka has been plagued by increasing household waste brought by economic development and transformed lifestyle. Household waste is dumped and left open in disposal sites, causing issues of foul smell, poor hygiene and contamination of underground water. The remaining life of disposal sites is getting shorter as well. Approximately 55% of the household waste is garbage, an organic waste material. Recycling garbage as compost through aerobic fermentation effectively reduces the volume of garbage. The Project was selected for the "Verification Survey with the Private Sector for Disseminating Japanese Technologies (SME Verification Survey)" by Japan International Cooperation Agency (JICA) in 2013 and started operation in April 2017. Since then, 9 plants were delivered to the government of Sri Lanka in the first phase of construction, and additional second phase of construction has been promoted in 2020. An additional second phase of construction is underway despite the economic crisis in Sri Lanka in 2022. Since the waste problem in developing countries is growing larger every year, there is interest in the composting plant from outside Sri Lanka, and negotiations are underway with governments and municipalities in other countries to commercialize the project.

■ Challenges and Responses in Business Expansion

Due to differences in business practices between Japan and Sri Lanka, the procedure took a great deal of time. By understanding local business customs, identifying the right person, and building a relationship of trust with local government officials through accumulated experience, the company has been able to expand the number of cases introduced.

▲Compost plant

■ Business Model of the Project

Kawashima Co., Ltd. exports the equipment manufactured in Japan to local governments. Local partner companies of Kawashima provide maintenance, manage operations and supervise project execution.

▲9 system are under construction

Related SDGs

■ Key Success Factors

Since the introduction of a new technology always requires a proven track record, we established a relationship with the local government through JICA's dissemination and demonstration program and demonstrated the technological and economic advantages, which led to the subsequent introduction of the technology in the Sri Lankan government budget. Kawashima implemented capacity building programs for local counterparts through the relationships with various partners including Kawasaki City Government, which provided guidance in the food waste sorting, successfully building up a supply chain for recycling food wastes. Compost plant business has increased local employment of women and contributed to solving the issues of poverty of women, which facilitates its local acceptance.

Product & Technology

Compost Plant "RA-X": A screw-shaped auto mixer that mixes organic waste material for even aeration and maintains aerobic fermentation at high temperature for effective production of high-quality compost. The device is affordable and easily maintained.

"BX-1": An active microorganism feed that deodorizes and turns mud, sludge and animal wastes into compost. Its main ingredient is rice bran, and it accelerates fermentation of compost while curbing odor during the fermentation process.

Both "RA-X" and "BX-1" are Kawashima's proprietary technologies, which can achieve the same effect in any environment and do not require special technical skills for operation and the former has been patented (Patent Number: 3607252). A project based on the both technology has been registered as Clean Development Mechanism (CDM) project in 2011.

▲Screw-shaped Compost Plant "RA-X"

▲Vegetable cultivated using compost

Challenges for Further Development

Demand for small plants is high, and the company is considering in-house local production, but ensuring durability is an issue. The Company plans to extend the Project into Asia over a medium to long term. It can be used for both the detoxification of food waste as an infrastructure project that contributes to improved sanitation and the production of compost as a soil conditioner that improves agricultural productivity.

Profile of Project Company

Kawashima Co., Ltd. was established in 1987 and developed "RA-X", a compost plant in 2000. The Company manufactures and sells the plant and upholds the corporate mission to establish a recyclable society through its eco-friendly technology.

21. Greater resilience and higher income of farmers through "Farming for the Next 100 years "

Saka no Tochu Ltd. https://www.on-the-slope.com/

Challenges Addressed | ⑥ Food insecurity

Adaptive Challenges Due to climate changes, the crop production in Southeast Asia is feared to dip 5 to 30% by 2025. In Lao People's Democratic Republic(hereafter referred as Laos), the agricultural sector accounts for 30% of GDP and this is also the livelihood for 65% of the population. Therefore, strengthening resilience of farming industry is a top priority issue.

Contribution In the countries that vulnerable to climate change, Saka no Tochu recognized "lack of knowledge and technology of agricultural systems" and "lack of objective information on vulnerability assessment" are the adoption issues. We intend to develop a business model that will ensure the long-term sustainability of agricultural production through Giving the instruction to local farmers on cultivation methods of climate change tolerant varieties. As well as we realize stable profit returns through the development of domestic and international marketing channels.

Project Detail

■ Background

Country | Uganda, Laos, Myanmar, Nepal, Thailand, Indonesia, etc.

The Company with an aim at business in developing countries since its inception, launched the "Uganda Organic Project" in 2012. Under the project, Saka no Tochu dealed with "Shea butter" which is locally produced, and then expanded to sesame, vanilla beans which are produced in dry regions(through agroforestry).

In 2016, the Company launched the "Mekong Organic Project" which was supported as the "Climate Change Adaptation Effect Visualization Project" by the Ministry of Economy, Trade and Industry (METI) of Japan and subsequently the Company promoted the coffee production system through agro-forestry instead of traditional forest burning by ethnic tribes in the mountains . In 2018, the company launched "Umi no mukou Coffee" devision and it expands a coffee business in Myanmar, Philippines, Nepal, Indonesia and India up to date.

■ Challenges and Responses in Business Expansion

In the coffee industry, there is a big gap between producer countries and consumer countries . The formers produce coffee as a part of their culture which connected to their daily life, and the latters pursue the quality and price. Umi no mukou Coffee gives training and workshop for the farmers to produce market-quality coffee. In addition,the division is telling the story of the coffee producer countries to consumers.

▲Lao Forest Coffee

■ Key Success Factors

A key sucussess factor is the amount of local information, related with production sites. After that, the suitable crops and cultivation techniques for the area are selected based on preliminary research and close communication with farmers. Umi no mukou Coffee contributes to increase farmers' income by supporting the coffee farming and improving the quality.

▲coffee nut

Related SDGs

■ Business Model of the Project

The project focuses on the sales of products that maintain both environmental contribution and quality, produced based on environmentally-friendly, small-scale agricultural system that accommodates local climate, soil quality, historic and cultural context and thus contributes to the adaptation to climate change.

The marketing channels extend from the Internet retail sales to wholesale of raw beans to roasters. About the business in Laos, Saffron Coffee, which is the company equipped with coffee refinery and processing facilities as well as export license became a partner of Umi no mukou Coffee.

Product & Technology

Production technology: Organic farming, agroforestry: Under the project, Japan's high and versatile crop related technology is transferred through close-knit communication with producers. The technology is selected from a viewpoint of effective utilization of regional resources and applicability to different species while understanding the level of technology and knowledge of local farmers, regional soil environment and varying climate conditions.

Example: Agro-forest management (pruning method to accommodate change in the rainfall pattern and temperature, and shading), insect pest control, technical support of fertilization to increase the soil-moisture retention and productivity, and land consolidations for new area.

Marketing system: "Farm to Table": Under the system, agricultural products will be marketed for export to Japan as products that maintain both environmental contribution and quality. The system aims to secure stable sales by constant purchase by consumers with whom a relationship has been built upon understanding of the "Story of production sites and producers" through detailed explanations.

▲Coffee Plantation in Forests

▲Cultivation as Part of Life

▲Guidance for Local Farmers

Challenges for Further Development

In production, the project is in pursuit of collaboration with private sectors and research institutions for the establishment of a quantitative benchmark for the judgment of fermentation and maturity level.

The project successfully diversified the range of merchandize by transforming the coffee bean flesh that is usually wasted into dried "Cascara" in syrup.

In developing sales network, the project has built relationships that encourage constant purchase of highly value-added merchandize by appealing to consumers and raising their awareness of the "Story" of production sites and producers.

Profile of Project Company

Founded in 2009. With the company concept of "Farming for the Next 100 years", the company aims to create sustainable agriculture and realize sustainable society. Considering the merits and demerits of not using pesticides and fertilizers, the company sells agricultural products that are grown without environmental burden, and also provides the support to new farmers who want to engage in such type of farming. In addition, the company develops various business both in Japan and overseas, including the operation of the restaurant named "OyOy" which serves dishes with its own vegetables, and "Umi no mukou Coffee" which provides coffee cultivation advice, imports and sells in Asia. In 2018, the company was selected as a Regional Future Driving Company by the Ministry of Economy, Trade and Industry.

Inquiry regarding this matter
E-mail address: lab@on-the-slope.com

22. Adapting to changing cultivation environment for traditional crops

Dari K Co., Ltd. http://www.dari-k.com/

Challenges Addressed | ⑥ Food insecurity

Adaptation Challenge Irregular rainfall due to abnormal weather associated with climate change causes serious impact on agricultural products and erratic weather such as downpour and drought reduces crop yield.

Contribution Dari K Co., Ltd. promotes conversion from traditional agricultural products to high-quality cacao in Indonesia which requires less water and fertilizer. It serves as an adaptation measure in terms of sustainable food supply and stronger agricultural production base to promote weather-consistent agriculture and production of value-added crops which contributes to greater income of farmers.

Project Detail

■ Background

Country | Indonesia

In Indonesia, there are areas where yields of conventional crops are expected to decline due to reduced rainfall, and Dari K has started overseas development as a project adopted by the Japan International Cooperation Agency (JICA) in fiscal 2014 under its "Preparatory Survey for Cooperation (Promotion of BOP Business Collaboration)*" and the Ministry of Economy, Trade and Industry in fiscal 2015 under its "Visualizing Climate Change Adaptation Benefits Project. The project aims to shift to cacao, which consumes relatively less water and fertilizer, and to reduce vulnerability to climate change and improve the adaptive capacity of small-scale farmers by introducing and disseminating high-value-added cacao agroforestry. In 2016, a local corporation, PT. Kakao Indonesia Cemerlang (KIC), was established to provide guidance on fermentation technology in parallel with awareness-raising activities for farmers engaged in cacao production; in 2020, the local corporation will conduct intensive fermentation of cacao beans, creating an environment where farmers can concentrate on cultivation. In 2022, the company will join the LOTTE Group to further expand its business.

■ Challenges and Responses in Business Expansion

It took a lot of effort to gain understanding of the importance of quality improvement from Indonesian farmers, who had never been asked for cacao quality before. Since verbal and material explanations were not sufficient, taking the time to work together with them has now made it possible to stabilize quality.

■ Key Success Factors

The trusting relationship with farmers built by leaning on them to make improvements even when quality is unstable and by demonstrating full commitment to the local area has led to improved quality and stable yields.

▲Local farmers

Related SDGs

■ Business Model of the Project

They establish a mechanism that creates added value at the upper levels of the supply chain and improves the income environment for farmers. Simultaneously, by handling the import and processing themselves, they are manufacturing high-quality chocolate and contributing to the improvement of the reputation of Indonesian cocoa

Product & Technology

Direct import of Indonesian cacao beans and production and sales of chocolate as end products: In Indonesia, cacao beans were originally shipped without the "fermentation" process, which is essential for making delicious chocolate. To produce cacao in Indonesia with the quality demanded by the Japanese market. At first, educational activities were conducted to local cacao farmer about the necessity of fermentation. Then, the company will teach actual fermentation techniques to the farmers, and further improve their income environment by directly purchasing the high-quality fermented cacao beans. At the same time, to dispel the impression of Indonesian cacao beans as unfermented and of low quality, and to raise public awareness of these beans as high-quality cacao beans. It directly purchases them, manufactures and sells chocolates made from them. The company is also making efforts to actively employ local women to sort cacao beans and promote sixth industrialization. The company is also engaged in upcycling initiatives, such as generating electricity from biogas using cacao husks and utilizing cacao husks, which are normally disposed of as industrial waste, for packaging. The company is also taking on the challenge of upcycling cacao husks, which are normally disposed of as industrial waste, to be used as packaging.

▲Quality Assurance with Local Staff

▲Checking Growth of Cacao Trees

Challenges for Further Development

The Triple Win described below will be realized to further develop the business, but the challenges are to build a value chain in which all producers, chocolate processors, and consumers can find value, and to deal with declining productivity and intensifying use of pesticides due to climate change.

(1) Farmers obtain knowledge and skill on how to grow high-quality cacao and enjoy higher income.
(2) Dari K, as chocolate manufacturer, secures the procurement of high-quality cacao beans.
(3) Consumers go beyond “donation” and spend on authentic high-quality products.

Profile of Project Company

Dari K Co., Ltd. was founded in March 2011 to manufacture and sell chocolate and other cacao-related products as well as for import and wholesale of cacao beans. The Company was acknowledged by Kyoto City in April 2016 as one of the “Enterprises to sustain upcoming 1000 years” and by the Ministry of Economy, Trade and Industry of Japan in May 2016 as one of the “VIBRANT (HABATAKU) Small and Medium Enterprises 300.” In May 2017, Kanazawa Institute of Technology and BoP Global Network Japan awarded the SDGs Business Award 2017 "Engagement Award", and in 2023, the packaging utilizing cacao husk won the Japan Package Design Award 2023 "Silver Award" and “iF DESIGN AWARD.”

23. Greening and transforming arid lands into farmlands using rice husk briquettes and biochar

Tromso Co., Ltd. https://tromso.co.jp/en/

Challenges Addressed | ② Droughts, ⑥ Food insecurity

Adaptation Challenge Drought and the consequent desertification are becoming more serious due to climate change. In the semi-arid Sahel region, which stretches across the southern part of the Sahara Desert, the land available for agriculture is decreasing, and securing stable supplies of food and drinking water is a challenge.

Contribution The development of climate change-adaptive agriculture by combining the Rice husk solid fuel production equipment "Grind Mill" by Tromso and biodegradable agriculture material "PLA (polylactic acid) Roll Planter®" by Toray Industries will promote greening and transformation of arid lands into farmlands and contribute to securing stable food supplies.

Project Detail

■ Background

Country | Senegal, Vietnam, etc.

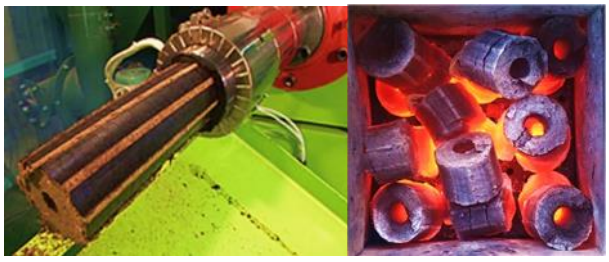
To address drought and desertification in the Sahel region, the "Great Green Wall Initiative (GGWI)", a long-term plan for reforestation and land restoration, was launched in 2007 under the leadership of the African Union. Also in 2016, JICA, the United Nations Convention to Combat Desertification (UNCCD), the Government of Kenya and the Government of Senegal have jointly launched the "African Initiative for Combating Desertification to Strengthen Resilience to Climate Change in the Sahel and the Horn of Africa (AI-CD)", to provide support for combating desertification in the region. With the aim to collaborate with such international efforts, the consortium comprising Tromso, Toray Industries (and group company Toray International), and Oriental Consultants Global (OCG) introduced a climate change-adaptive agricultural method using the Grind Mill and the PLA Roll Planter® to the Government of Senegal, which received positive response. A small-scale demonstration project with the Senegalese Agricultural Research Institute (ISRA) started in 2022, and further considerations on entering the GGWI will be made based on the results.

■ Challenges and Responses in Business Expansion

There was a reaction that the generation of the initial cost was a hindrance in developing countries. Therefore, it is considering the establishment of a business model in which finance companies bear the initial costs and the local area does not have to bear investment risks.

■ Key Success Factors

Local collaboration is essential, and the achievements accumulated through the utilization of JICA projects have been recognized, leading to business expansion primarily in Africa through inquiries from international partner companies. Additionally, collaboration with domestic universities has facilitated technological advancements.



▲ Risk husk briquette Momigalite

Related SDGs

■ Business Model of the Project

A project to combine rice husk briquette "Momigalite" produced by Tromso's Grind Mill and Toray Industries' PLA Roll Planter® for agricultural use will be demonstrated in the public sector in collaboration with ISRA, to examine the effects on agricultural productivity. In the future, direct sales to farmers are considered.

Product & Technology

Rice husk solid fuel production equipment "Grind Mill" (Tromso): Produces wood briquette Momigalite by crushing, compressing, and heating rice husks. Momigalite can be used mainly as fuel, such as substitute for fossil fuels by greenhouse farmers in Japan, as well as substitute for firewood which is declining due to deforestation in foreign countries. Ground Momigalite can be used for soil conditioning, and has so far been supplied to farmers in Asian and African countries. In addition, it can also be used as bedding material for cattle barns and as compost.

Enhancing agricultural productivity through the utilization of biochar: By producing biochar from agricultural residues and using it as a substitute for chemical fertilizers, agricultural productivity can be improved. In a pilot experiment conducted in Uganda (in collaboration with a local university), it was found that the application of biochar increased crop yields by approximately 20% and reduced chemical fertilizer usage by around 50%. Moreover, calculations on the extent to which biochar can substitute for the necessary nutrients such as nitrogen, phosphorus, and potassium, are also provided to farmers, contributing to stable food supply.

▲Agricultural demonstration using biochar

Challenges for Further Development

As for the use of biochar in the agricultural field, we have accumulated know-how through demonstration experiments, and will promote full-scale commercialization.

It is necessary to adjust the timing of product introduction according to the local cultivation cycle in order to maximize the introduction effect.

Since the initial investment cost is high for farmers, it is necessary to examine the cost-effectiveness while utilizing public funds and blended finance.

Profile of Project Company

Established in 2007. Manufactures and sells Rice husk solid fuel production equipment "Grind Mill". Through the "Verification Survey with the Private Sector for Disseminating Japanese Technologies for Utilization of Resources through Rice Husk Briquette Machines" supported by JICA in 2013, Tromso started overseas expansion to Africa and ASEAN regions. Tromso exhibited Grind Mill and PLA Roll Planter® at the Virtual Japan Pavilion at COP27 and COP28 as well as G7 Hiroshima Summit (exhibited Grind Mill at the venue).

24. Rejuvenation of arid areas through high-molecule film farming method

Mebiol Inc. https://www.mebiol.co.jp

Challenges Addressed | ⑥ Food insecurity

Adaptation Challenge Shortage of water and soil degradation triggered by climate change affect the stable food supply and food quality.

Contribution Mebiol Inc. developed a high-molecule film farming method called "Imec®" that enables the production of highly-nutritious agricultural crops under harsh environment as well as creating jobs for local community. The technology serves as an adaptation measure by contributing to greater economic capacity for stable food supply and stronger production base.

Project Detail

Country | UAE, China, etc.

■ Background

The Company was founded in 1995 by Dr. Yuichi Mori who engaged in research and development of membrane/hydro-gel materials used for dialysis and other medical and pharmaceutical products in an attempt for application to agriculture. Approximately ten years were spent for the development of "Imec®", a film farming method to produce safe and highly nutritious agricultural crops. The business in Japan expanded mainly among new agricultural ventures and new entrant farmers. "Imec®" that enables "Agriculture by anyone, anywhere" is increasingly recognized to meet the demand of farmers for recovery and rejuvenation of their farms severely hit by major earthquakes in Japan, or to meet the demand of areas overseas not suitable for farming. In the Middle East, where there are many deserts, "Imec®" is being used for tomato cultivation in the UAE because of its ability to save water resources, and in China because of concerns about soil and water pollution. Currently, a JICA private-sector partnership project is being implemented in Kenya. In addition, "Imec®" has been introduced in various domestic and international media, and there are inquiries from Southeast Asia and other countries.

▲Chairman Dr. Mori with "Imec®"

■ Challenges and Responses in Business Expansion

"Imec®" makes it possible to grow high value-added crops while saving water in deserts and drought areas where it was previously impossible to grow crops, although there is no market for high value-added crops, so a market must be created.

■ Key Success Factors

Simple and versatile technology

・The technology can be introduced so long as water and power source are provided, and compared to conventional hydroponic culture, it greatly curbs the consumption of water, fertilizer, electricity, heavy oil and labor costs, leading to low-cost and highly profitable farming business.

・The technology can be marketed throughout the world regardless of business environment.

・Despite the need for installation of a water purification equipment along with the technology, the technology well maintains profitability due to low water consumption.

▲Tomato farming by local people

▲Tomato farm in Dubai Desert

Related SDGs

■ Business Model of the Project

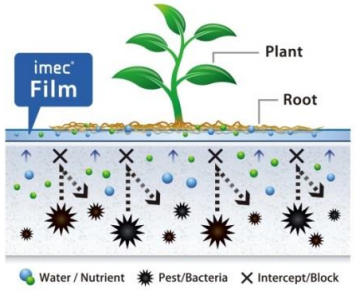
The Company is a fabless company with a key business focus on R&D and marketing, sourcing revenues from royalty payments for the patented "Imec®" technology with patent registered in 130 countries. For overseas business, "Imec®" is exported from Japan and farm facilities are procured locally. Sales and cultivation advices are provided by local agents.

Product & Technology

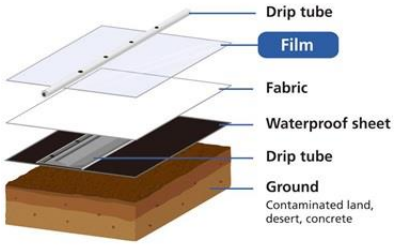
"Imec®": A one-of-a-kind sustainable agricultural technology that applies membrane and hydrogel technology developed for medical applications to agriculture to produce safe, highly nutritious agricultural products. Capable of growing a variety of crops such as fruits and vegetables and leafy greens on polymer films. Newly registered as a "sustainable film farming method" with the Sustainable Technology Dissemination Platform (STePP) of the United Nations Industrial Development Organization (UNIDO) Tokyo Office in March 2018. The main features of "Imec®" are as follows.

・No-soil farming: Only water and nutrients penetrate the nanosized pores on the films and thus the infiltration of disease-causing germs and viruses will be prevented while saving water.

・ High water retention: The films, retaining ample water but keeping dry surface, control the nutrition value (sugar concentration, etc.) of vegetables. Water and fertilizers are much saved as compared to conventional farming methods as the anti-seeping sheets help retain the water and fertilizer supplied from seeping externally.



▲"Imec®" Film



▲Simple and Affordable "Imec®" System consisting of fluid supply equipment and Cultivation Bed

Challenges for Further Development

Since the technology has been perfected, the key point is how to expand overseas. In addition to establishing distributors in each country, it will be necessary to create a market for high value-added crops.

Profile of Project Company

Mebiol Inc. was founded in 1995 as a R&D venture for the purpose of utilizing hydro-gel materials in the agricultural field. In the domestic market, cultivation of high-quality tomato is in a full-fledged operation using "Imec®" which enables high profitability, and the total cultivation area stretches to 40 hectares. In overseas markets, the company launched business in the Middle East, China, Brazil and so on. The company was awarded the "Special Mention Award" of the "University originated Venture Award - Award for Academic Startups –" by Japan Science and Technology Agency (JST) in 2016, the "Small and Medium Enterprise Agency Director-General's Award" of the Japan Venture Award by SME Support Japan in 2017, the "Japan Techno-Economics Society Chairman's Award" by the Japan Techno-Economics Society in 2018, "The International Award: Innovative Ideas and Technologies in Agribusiness" by UNIDO ITPO Italy in 2019, and "Green Sustainable Chemistry Award" by Japan Association for Chemical Innovation in 2021, the 23rd Energy Globe Award "National Award 2022" sponsored by UNIDO in 2022.

Inquiry regarding this matter
Contact person: Mebiol Inc., Administration Department, Hiroshi Yoshioka
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E-mail address: yoshioka@mebiol.co.jp

25. High quality mung beans production in salinized lands

Euglena Co., Ltd. http://www.euglena.jp/

Challenges Addressed | ⑥ Food insecurity

Adaptation Challenge The issue of soil salinization due to the influx of salt water into rivers and underground water on account of the rising sea level and coastal erosion triggered by climate change are gaining significance.

Contribution By engaging in mung beans production utilizing agricultural technology based on appropriate cultivation management in regions affected by soil salinization, Euglena Co., Ltd. has contributed to improving lives of local residents through reducing poverty by generating job opportunities for farmers, increasing income and enhancing nutrition with cultivation technology for better crop yield and quality of mung beans.

Project Detail

Country | Bangladesh

■ Background

In Bangladesh, euglena Co., Ltd. established a joint venture (currently Grameen euglena) with Grameen Group in 2010. A trial cultivation of mung beans also started in the same year. Through implementation of the "Climate Change Adaptation Effect Visualization Project" supported by the Ministry of Economy, Trade and Industry of Japan from 2012 to 2015, the large-scale cultivations and exports to Japan have started since 2012.

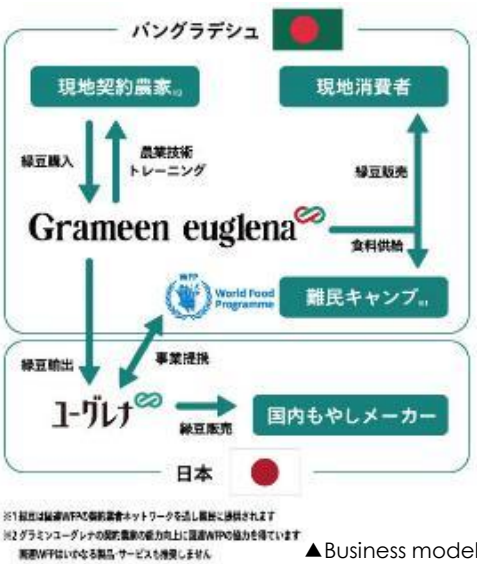
■ Challenges and Responses in Business Expansion

When launching the business, it was necessary to start by gaining an understanding of the differences in demand for mung bean usage and quality between the two countries. Repeated meetings with local farmers were held to build mutual understanding and trust. In the management of local staff, we have created a low-cost, easy-to-work-in environment by adopting and utilizing methods adapted to local customs.

■ Business Model of the Project

Grameen euglena guides farmers on cultivation method, sells mung beans in Bangladesh, and sorts mung beans to meet required quality in Japan to supply mung beans to Japanese bean sprout producers. In 2019, the project has also started a food support for Rohingya refugees inflowing from Myanmar to Bangladesh through the collaboration with World Food Programme (WFP). In 2022, a second collaboration has been agreed.

Grameen euglena purchases mung beans from contract farmers and utilize the products for food support to Rohingya refugee. The necessary activity costs will use a portion of the grant provided by WFP agreed with Ministry of Foreign Affairs of Japan.



▲Business model

Related SDGs

■ Key Success Factors

Success of the Project is largely attributable to its community-based style such as the launch of a Joint venture with local partner which helped to nurture trust with the government of Bangladesh as well as the establishment of a value chain through the development of sales network in Japan. As of 2023, the number of contracted farmers will be approximately 6,000, and a portion of the mung beans grown will be used to provide food aid to Rohingya refugees through a business partnership with the World Food Programme (WFP).The direct commitment of Japanese people, together with local staff who are well versed in Bangladeshi customs, enables a direct approach to the production of Japanese quality agricultural products.

Product & Technology

By providing and guiding the retention of the following knowledge and know-how, etc., the company contributes to the improvement of quality and living standards.
Quality Improvement in Mass Production: Sowing seed, Plowing, calcium fertilizer, review of seeding period
Technical training for process of harvested crop: Drying method by farmer, Sorting method
Verifying effect of rotating crop: Survey by the field and conditions, survey of root nodule bacteria by the harvest period

▲Sorting mung beans

▲Packing mung beans

Challenges for Further Development

In the future, the company aims to diversify its cultivation areas and crops, increase yield and improve quality, and further expand its business while contributing to the improvement of the local environment. The challenge will be to continuously improve the quality of mung beans by developing technical leaders and training farmers to cultivate mung beans that meet Japanese quality standards.

Profile of Project Company

euglena Co., Ltd. was incorporated in 2005 with the corporate philosophy of "Make People and the Earth Healthy". The Company strives to solve the global food and environmental issues through its business activities such as the research and development, production and sale of microalgae euglena (Japanese name: Midori-mushi (green bug)). The scope of business of the Company leveraged on the technology stretches from healthcare (food and cosmetics) to energy and environment (bio diesel fuel and bio jet fuel). Mung bean project in Bangladesh is one of the businesses which represents its aim of sustainable development of human and the earth. President Mitsuru Izumo of euglena Co., Ltd. was selected as Young Global Leader 2012 by the World Economic Forum (Davos Forum), and won the Prime Minister's Award under the First Nippon Venture Award (2015), the Minister of Education, Culture, Sports, Science and Technology under the Sixth Technology Management and Innovation Award (2018), the SDGs Promotion Headquarters Chief's Award (by Prime Minister) under the Fifth Japan SDGs Award (2021), as well as the 8th Tadao Ando Cultural Foundation Award (2022).

26. Cultivation of fruit vegetable crops with optimized application of water and fertilizer using an IoT and AI based autonomous drip irrigation system

Routrek Networks Inc. https://www.routrek.co.jp/

Challenges Addressed | ⑥ Food insecurity

Adaptation Challenge The impact of climate change on agriculture is significant, including water shortages for agriculture due to decreasing water resources and poor crop growth due to changes in weather.

Contribution Routrek Networks' ZeRo.agri® is an autonomous drip irrigation system that utilizes IoT and AI to reduce and optimize the use of water and fertilizer. In addition, AI analyzes environmental data on soil and solar radiation as well as weather forecasts to adjust the concentration of liquid fertilizer and other factors on extremely hot days, thereby contributing to improved yield and quality.

Project Detail

Country | Vietnam

■ Background

Routrek Networks has been planning to expand business in the Asian monsoon region, which has similar climatic conditions to Japan, and conducted demonstration experiments in China (Shanghai), Thailand, and Vietnam, all of which were successful in cultivation. Among them, Dalat highland of Vietnam was selected as the first overseas project site, in terms of climatic conditions, proximity to agricultural consumption areas, and ease of branding. In 2017, the company conducted a JICA feasibility survey and succeeded in multiple cropping using ZeRo.agri® (cultivation of four varieties with one ZeRo.agri® unit). Currently, the company is preparing for commercialization.

■ Challenges and Responses in Business Expansion

Routrek is investigating potential challenges in commercialization, and price may be a bottleneck in developing countries. However, since commodity products are used for parts other than the core engine parts, Routrek is considering a knockdown system in which parts other than the engine parts are assembled locally.

■ Key Success Factors

The utilization of IoT and AI has been evaluated for its ability to simultaneously solve environmental problems such as water depletion and social problems such as lack of agricultural leaders. The capital and business alliance with Kubota has accelerated the expansion of its business, including overseas expansion.

▲ A farm in Vietnam

▲ ZeRo.agri® in a farm in Vietnam

▲ Cultivation example (melon)

Related SDGs

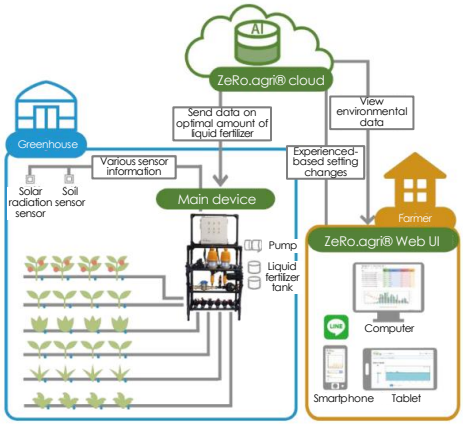
■ Business Model of the Project

Towards deployment in developing countries, hardware is planned to be procured locally to reduce costs. Software is expected to be licensed and license fees will be collected from local business partners (sales agents). Promotional activities are also considered, to enable farmers in Vietnam to use ZeRo.agri® to grasp the harvest amount and timing, and provide information to the distribution market, thereby adding value (increased unit sales price) to their crops.

Product & Technology

ZeRo.agri®: A drip irrigation system that automatically controls irrigation and fertilizer management by acquiring soil moisture and solar radiation data, using IoT and AI. The system consists of the ZeRo.agri® main device combined with various sensors, and a Web UI where one can check the irrigation and fertilization status as well as sensor information. An AI-based cloud system connects the main device and Web UI, and optimizes the supply amount and concentration of liquid fertilizer. Based on the information acquired by the environmental sensors, the AI estimates the daily transpiration amount required by the crops, and irrigates and fertilizes through the drip tube, enabling highly accurate management that is difficult to achieve manually, and minimizing the amount of water and fertilizer used. (Target values for automatic control can also be manually set based on the farmer's own experience, and the history of these setting changes will lead to further improvements in the accuracy of AI.) Automatic control using AI will also contribute to yield stabilization, quality improvement, and labor saving.

▲ ZeRo.agri®



▲ Concept of ZeRo.agri®

Challenges for Further Development

Since it is different from conventional farming methods, it is necessary to provide farmers with careful explanations and training on how to use the technology. In addition, when transitioning from conventional farming methods, (1) backing up the technology with production data (cultivation results) from ZeRo.agri® in each region, (2) developing a local support system for farmers, and (3) supportive measures from the government, local authorities, etc. will be key to the dissemination of the technology.

Profile of Project Company

Established in August 2005, with the aim to realize a sustainable society through M2M (now IoT) technology which connects devices to devices via the Internet. The company entered the agricultural sector in 2011 and launched a full-scale digital farming business in 2015. The AI irrigation and fertilization system ZeRo.agri® and related services have been developed, and about 300 units have been introduced throughout Japan (as of September 2021). In 2018, the company received the 4th Nippon Venture Awards (Agriculture Venture Business Award, Minister of Agriculture, Forestry and Fisheries Award). In the same year, the company was selected as a J-Startup company by the Ministry of Economy, Trade and Industry and as one of the representing innovations in Japan on the "Innovation Japan" website by the Prime Minister's Office. In addition, the company is aiming to accelerate its smart agriculture business by raising Series C funds in 2020.

27. Mitigating impact of frequent forest fire on plants and animals

Shabondama Soap Co., Ltd. https://www.shabon.com/

Challenges Addressed | ⑨ Ecosystem loss

Adaptation Challenge The rise in temperature associated with climate change is said to accelerate dryness in mountainous areas and forests, making them prone to forest fires, which causes air pollution that may adversely affect the health of people in a wide area. The loss of forests also exacerbates the collapse of ecosystems, impairing the food production base due to disruptions in the food chain and changes in habitat environments, ultimately leading to the extinction of flora and fauna which may serve as resources for pharmaceutical supplies.

Contribution Shabondama Soap has developed a soap-based fire extinguishing agent that is environmentally friendly and has high fire extinguishing capability. The agent is made using additive-free soap and does not contain synthetic surfactants. By diluting the fire extinguishing agent with water, it is possible to extinguish fires more quickly and effectively, using less water compared to just water alone. Curbing the loss of forests associated with climate change serves as an adaptation measure in the fields of health and sanitation, food security, and the strengthening of the food production base.

Project Detail

■ Background

Country | Indonesia

Forest fires in dried peatlands are extremely hard to extinguish and can last for a long time due to their high carbon content. Indonesia, home to almost half of the world's tropical peatlands is referred to as the "Global Powder Keg", as forest fire pose a significant threat to the country. Shabondama Soap conducted a study and demonstration project in 2013 under a Japan International Cooperation Agency (JICA) program to demonstrate the usage of fire extinguishing agent on peatland in Indonesia. In 2023, the contract was concluded for a JICA commissioned dissemination and demonstration project. Commercialization efforts are underway, by demonstrating the effectiveness of the agent and firefighting methods to stakeholders at test sites that are able to replicate peat fires. The project has also been featured in news programs and video websites overseas and is currently being negotiated with other countries that have shown interest in the project.

■ Challenges and Responses in Business Expansion

Due to the need for rapid compliance with regulations that vary from country to country, the company has partnered with firms possessing extensive local knowledge. Furthermore, by leveraging JICA projects and enhancing collaboration with local authorities, the company is striving to facilitate smooth business development.

■ Key Success Factors

The soap-based fire extinguishing agent has widely been accepted in the local market for its environmental friendliness and immediate effectiveness in addressing the cross-border haze issue caused by forest fires.

Related SDGs

■ Business Model of the Project

Sales to major local suppliers of fire extinguishing equipment and materials started in 2015. Shabondama Soap conducted a market survey in Indonesia from 2016 under the JICA program. The Company strives to conserve the habitat of plants and animals through measures against peatland haze caused by forest fires in dry season, and the protection of forests through the prevention and extinguishing of forest fires. The company plans to develop products for public institutions and plantation owners. For the supply to public institutions, the company is considering a business model to sell through local distributors, with the possibility of local production in the future.

Product & Technology

The main ingredient of the soap-based fire extinguishing agent is soap, which has low toxicity. Despite having the same fire-extinguishing performance as synthetic fire extinguishing agents, the soap-based fire extinguishing agent has a significantly lower impact on the ecosystem due to its high decomposition rate and its tendency lose its surfactant effect when binding with minerals that are abundant in nature such as calcium and magnesium. In 2007, it received the "Minister of Internal Affairs and Communications Award for Meritorious Service in Industry-Academia-Government Collaboration" from the Cabinet Office. The product has also garnered attention as a tangible and and effective measure against forest fires that are prevalent in vast regions of Southeast Asia, Europe, Australia, and the United States, and is poised to be a potential "game changer" in the fight against global warming.

▲Soap-based extinguishing agent

▲Fire extinguishing

▲Project Briefing to Local Affiliates

Challenges for Further Development

We aim to continuously introduce products through the steady implementation of JICA's demonstration projects and conducting negotiations with other countries. Deployment will initially be pursued through exports from Japan, but it will be necessary to determine the timing of the establishment of a local production system in order to enhance mass production and cost competitiveness.

Profile of Project Company

Shabondama Soap Co., Ltd. was founded in 1910 as "Morita Hanjiro Shoten" (name change to Shabondama Soap in 1975). Since 1974, the company has strived to develop products that are gentle on both people and the environment. The company manufactures and markets additive-free soaps that contain no chemical or synthetic additives. In 2001, at the request from the regional fire department in Kitakyushu City, which recognized the need for a fire extinguishing agent which required less water, the company initiated a joint development project with the University of Kitakyushu. The initiative was prompted by lessons learned from the Great Hanshin Awaji Earthquake, where damaged water pipelines aggravated fires and hindered firefighting efforts. Subsequently, the Company successfully commercialized the soap-based fire extinguishing agent which has been on the market since 2007. The promotion and adaption of the soap-based fire extinguishing agent in Indonesia aligns with the company's corporate philosophy of contributing to society and protecting the planet's environment through its business activities.

28. Providing Big Data for Climate Change response support

Remote Sensing Technology Center of Japan https://www.restec.or.jp/

Challenges Addressed | ③ Floods, heavy rain & typhoons

Adaptation Challenge Changes in the pattern of rainfall and temperature particularly pose a serious threat to developing countries of which the economy is mostly dependent on traditional agriculture.

Contribution The Remote Sensing Technology Center of Japan (RESTEC) provides solutions to users in responding to climate change mainly through the visualization and statistic processing of satellite observation data.

Project Detail

■ Background

Country | Thailand, Myanmar

RESTEC has operated the satellite observation for over 35 years as a remote-sensing specialist agency, ranging from receiving and processing of the Earth observation data, development, revision and verification of the ground systems and data provision for users. As international cooperation is inevitable in conducting observations on a global scale, RESTEC has been engaged in various international activities through partnership with organizations, such as the Japan Aerospace Exploration Agency (JAXA) and Asian Development Bank, including assisting Thailand for flood observation in response to the major flood that struck Bangkok in 2011 and providing information on food supply and agricultural meteorology for Asian countries. In 2014, in cooperation with Sompo Holdings, Inc (Reference: Case Number 55) that had already launched "Weather Index Insurance" for farmers in Thailand, RESTEC successfully addressed the issue of poor infrastructure for weather observation and lack of historical meteorological data that had hindered the development of such insurance and developed one in Myanmar. The "Weather Index Insurance" utilizing the rainfall estimates taken from satellite data is the first-of-its kind activity by a Japanese entity.

■ Challenges and Responses in Business Expansion

In the development of insurance products for Myanmar, work was often put on hold due to political unrest in the country, but the company began selling them through coordination with the local government, led by Sompo Holdings, which sells insurance.

■ Key Success Factors

RESTEC representatives, who have a broad understanding of algorithms in satellites and the scrutiny of data from satellites, learned how insurance works, combined with their knowledge of data from satellites, discussed with insurers what data sets would be needed, and contributed to the launch of "Weather Index Insurance."

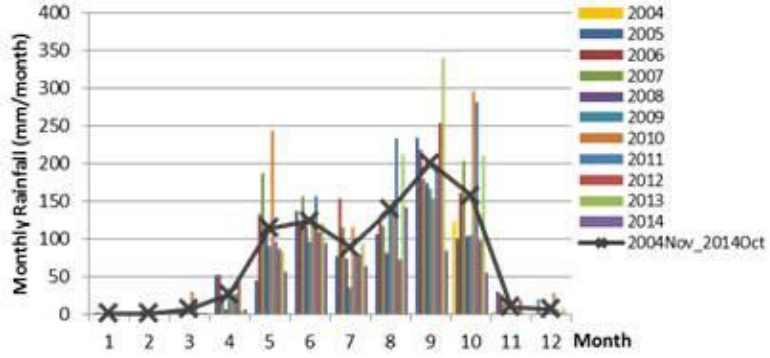
Related SDGs

■ Business Model of the Project

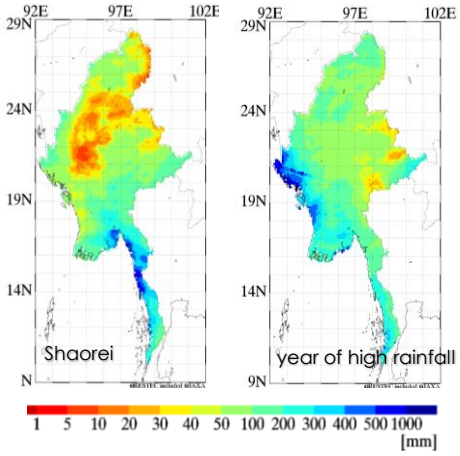
RESTEC offers statistic processing of the rainfall data from JAXA satellites (GSMaP data) for "Weather Index Insurance" project in Myanmar by Sompo Japan and contributes to visualization of the data. The next step is offering the a smart-phone application for local farmers.

Product & Technology

The observation equipment (sensors) loaded on satellites, applied with the remote-sensing technologies that enables remote observation of the Earth's surfaces, provides users with the data collected from satellites, aircrafts, automobiles, observation towers, ships and buoys and makes contributions across such fields as forestry management, water resource management, food safety and security, disaster observation, and national land management.



▲Comparison of monthly cumulative rainfall at discretionary areas in years from 2004 to 2014, displaying the differences from the annual average rainfall of each year.



▲ Cumulative rainfall map for the month of May in Myanmar, showing the differences of year 2005 with less rainfall and year 2010 with more rainfall

Satellite rainfall data are adopted for monitoring of monthly cumulative rainfall and comparative analysis with past data. Visualized results will be provided to users.

Challenges for Further Development

For greater awareness across the private sector and social impact, the forthcoming initiatives will be as follows:

・Highlighting the value of remote-sensing data to the society through the extended deployment of applications which will facilitate the infrastructure incorporating both tangible and intangible elements.

・Contributing to the achievement of Society 5.0 and SDGs through a business model established on 4Cs – Customer Value, Cost, Convenience and Communication.

Profile of Project Company

RESTEC was established in 1975, and launched the operation of image analysis equipment in 1976 and satellite data distribution business in 1978. Since then, RESTEC has consistently built up a range of remote-sensing technologies ranging from the operation of satellites to the receiving, processing, and analysis of observation data. Based on these technological capabilities, RESTEC has aggressively pressed ahead with developing human resources through training and cooperating with other agencies on international projects. By providing users with the data collected from satellites, aircrafts, automobiles, observation towers, ships and buoys through the remote-sensing technologies, RESTEC strives to contribute across a range of fields including forestry management, water resource management, food safety and security, disaster observation, and national land management.

Inquiry regarding this matter
Contact person: Remote Sensing Technology Center of Japan, Data Support Center
Phone: +81-3-6435-6789
E-mail address: data@restec.jp

29. Increasing crop yields with sunlight-reflecting agricultural environmental control sheets

MARUWA BIOCHEMICAL Co., Ltd. https://www.mbc-g.co.jp/

Challenges Addressed | ⑥ Food insecurity

Adaptation Challenge The impacts of global warming have led to an increase in heat damage and disease susceptibility in crops, resulting in a significant decrease in yields.

Contribution Maruwa Biochemical has developed a sheet called "Slim White" that can reflect over 90% of sunlight. This sheet is utilized as a shade for agricultural mulch and greenhouses, effectively reducing the temperature and ground temperature inside the greenhouse. This contributes to mitigating damage to crops and minimizing the negative effects of heat on their growth.

Project Detail

Country | Vietnam

■ Background

In Vietnam, many crops are grown in places where the maximum temperature exceeds 40°C, but the problem is that crops die and grow poorly due to rising temperatures. Maruwa Biochemical Co., Ltd., which deploys Slim White sheets that reflect more than 90% of sunlight, conducted an efficacy study in Vietnam. As a result of using Slim White as a green house shade in a cucumber growing area in Hai Duong Province, soil temperature decreased by 11.5°C, and dead cucumbers grew healthily in plots where Slim White was not used. Also in Hai Duong Province, Slim White was used as mulch for kohlrabi cultivation, and the yield increased by 10% due to the lowering of soil temperature.

In aquaculture, the University of Can Tho, the best academic institution in Vietnam, and Slim White have been used to control water temperature in shrimp aquaculture. Slim White also has been used in the livestock sector in Ho Chi Minh City's Agricultural Hi-Tech Park.

■ Challenges and Responses in Business Expansion

It is difficult for farmers who grow common crops to understand the fact that Slim White increases yields. First, the company aims to expand its business in Vietnam by developing Slim White for farmers who grow high-value-added crops with high interest in increasing yields and building up its track record.

■ Key Success Factors

In a demonstration at a melon farm in Ninh Thuan Province, Slim White has been evaluated for its high heat barrier effect, showing higher effectiveness than its competitors made in Israel and Korea.

▲Use on melon farms in Ninh Thuan Province

Related SDGs

■ Business Model of the Project

Public organizations such as the Ministry of Agriculture and Rural Development in Vietnam have introduced customers, and sales are mainly made to house farmers through local distributors.

Product & Technology

The agricultural environmental control sheet "Slim White": This product is a sheet that reflects over 90% of all wavelengths of light and is primarily used as a shade for mulch and greenhouses. Compared to other materials such as aluminum sheets, it has a 1.5 times higher reflection rate, which helps to lower ground temperature and temperature inside the greenhouse, reducing heat damage to crops and minimizing the occurrence of diseases. Additionally, the scattered reflection of light disrupts the flight patterns of monocular pests that rely on light for balance, providing a secondary function of pest control.

The reduction in ground and air temperature achieved through the use of Slim White enables the cultivation of crops during hot seasons. It also contributes to reducing the use of pesticides by suppressing disease outbreaks and inhibiting the arrival of pests.

Slim White has excellent durability, and its effects can last for approximately five years. It is also applicable in aquaculture facilities and livestock barns, where it is utilized to support the healthy development of organisms and the cultivation of algae as feed.

▲Green House Shade (used in run houses)

Challenges for Further Development

They aim to further expand their operations in Vietnam and surrounding countries, targeting not only the agricultural sector but also the aquaculture and herbal market. They continue to collaborate with local companies and academic institutions to conduct ongoing demonstrations. Additionally, they engage in promotional activities such as requesting users to share their experiences on social media to increase the adoption of their products.

Profile of Project Company

Established in 1972, they engage in three main business sectors. The Agro business supports the improvement of agricultural productivity, the Green business provides support for golf course management, and the Materials and Home Gardening business contributes to the conservation of greenery and environmental beautification through the supply of materials. With the goal of achieving top-level development capabilities in the industry, they established the New Ami Development Center in 2022. They have been contributing to problem-solving through practical and innovative product development, high technical expertise in specific fields, and fast development speed.

30. Provision of microfinance using satellite data

STANDAGE Inc. https://standage.co.jp/

Challenges addressed | ⑩Economic loss & livelihood failure

Adaptation Challenge Severe natural disasters have severely damaged agriculture and reduced farmers' incomes. The decline in income has prevented the purchase of necessary fertilizers and agricultural machinery, leading to a vicious circle of declining resilience to natural disasters.

Contribution STANDAGE provides farm machinery and fertilizers through microfinance based on farmers' credit scores generated from satellite data, helping to improve farmers' resilience.

Project Detail

■ Background

Country | Nigeria

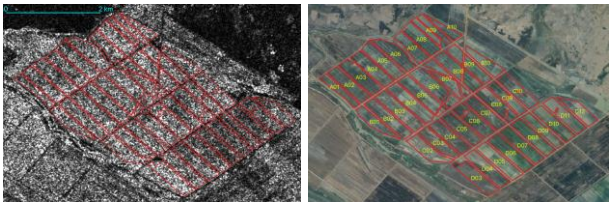
Farmers in rural areas of Nigeria have difficulty in obtaining personal credit information due to the lack of control over family registers and the inability to open accounts. In response to the recent severe natural disasters, farmers need to purchase fertilizers and install farm machinery to improve farming efficiency. STANDAGE, which has blockchain technology, is working with Space Shift, a company that develops satellite data analysis systems, to develop microfinance services for smallholder farmers using agricultural land satellite information to manage farmers' credit in Nigeria. Based on the results of interviews with farmers in Nigeria, STANDAGE provides farmers with agricultural machinery and fertilizers to limit the use of their funds, thereby establishing a system that enables farmers to make effective use of their funds.

■ Challenges and Responses in Business Expansion

If the local political situation becomes unstable and the currency continues to depreciate, it will be difficult to expand business. Since needs are very high in the local market, such as about 200 applications for one agricultural machine, the business scheme is being reexamined.

■ Key Success Factors

By limiting the use of funds, it increased the certainty of raising farmers' income. In addition, by using satellite data to create a credit score for small farmers who would otherwise be unable to obtain loans due to lack of credit information, the company has been able to make loans available to them and provide them with loans at lower interest rates than banks.



▲Agricultural Land Satellite Data Analysis Image

Related SDGs

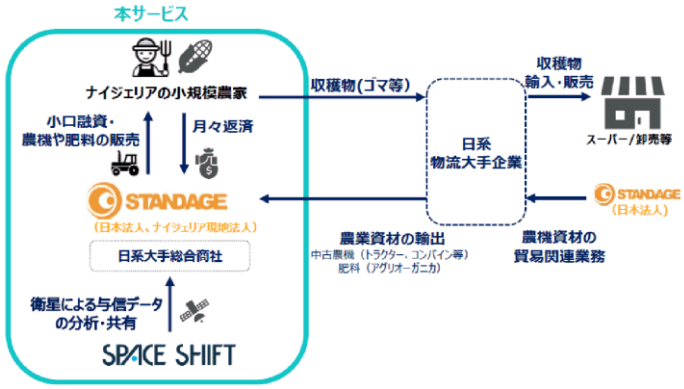
■ Business Model of the Project

Space Shift uses satellite data to track past farm progress. Based on the analysis results, STANDAGE creates a credit score for farmers and determines the credit score for microfinance. From the credit score, the Nigerian branch of STANDAGE provides farmers with access to farm machinery, fertilizer sales and subsqs and receives monthly repayments from farmers.

Product & Technology

Credit decisions based on satellite data: Visualize the growth process of crops by graphing backscatter intensity acquired by taking advantage of the characteristics of SAR (Synthetic Aperture Radar) satellite data, in which pixels become brighter as crop growth progresses. Data from the past three years are superimposed to check whether farmers are carrying out their farming operations systematically each year and to create a credit score.

Provision of agricultural machinery and fertilizers using microfinance : Credit scores based on satellite data are used to sell or lease agricultural machinery and fertilizers. Microfinance with limited use of funds ensures that the loans are used for agriculture, thereby increasing the certainty of repayment. In addition, STANDAGE has established an integrated supply chain, from arranging for used Japanese farm machinery to facilitating the sale of crops grown by farmers at higher prices.



▲Business Model Overview Diagram

Challenges for Further Development

Currently, STANDAGE is also developing an emergency food recycling business in Africa. STANDAGE will promote the stabilization of this business and at the same time reexamine the business model of the microfinance business, where the external environment has a significant impact on the continuation of the business. STANDAGE will contribute to solving local issues by shifting to a sustainable business model, as we continue to receive inquiries from the local market.

Profile of Project Company

Established in 2017. With the vision of realizing a world where all countries have equal access to everything, STANDAGE is developing a new trade settlement system using blockchain, as well as various other businesses to push the trade industry to the next generation stage. In particular, STANDAGE is developing its own trading business for Africa, and is also involved in sending and receiving payment verification experiments using its self-developed payment and settlement system. In addition, STANDAGE is currently contributing to the reduction of food loss and the resolution of poverty issues by selling emergency food that is close to its expiration date to NGOs and NPOs in Africa.

Inquiry regarding this matter
Contact person: STANDAGE Inc., Co-founder,/Vice President/COO, Kenta Omori
E-mail address: omori-k@standage.co.jp

31. Improving productivity by composting food waste

Well Create Inc. https://www.well-c.co.jp/

Challenges addressed | ⑥Food insecurity

Adaptation Challenge Fertile topsoil has been washed away by frequent heavy rains, resulting in a decline in agricultural productivity.

Contribution Well Create Inc., which has the technology to compost food waste, collaborates with NTT Business Solutions and provides a subscription service for the food waste compost machine, purchase the produced primary fermented product and compost. The company contributes to improving agricultural productivity, by encouraging farmers to use the compost as a soil conditioners.

Project Detail

Country | Malaysia

■ Background

In Malaysia, the disposal of food waste has become a challenge, as well as the need to improve soil condition affected by climate change, and to address the increase in demand of using chemical fertilizers. In 2015, Kitakyushu City, where Well Create is headquartered, signed a MOU with Malaysia's solid waste management public corpration (SW Corp), which was seeking to solve the issue of food recycling. This MOU enabled easier access to relevant local ministries and agencies and served as a foothold to expand business. Therefore, since 2017, the company has been working on composting food waste throughout Malaysia and in the Cameron Highlands, by utilizing JICA's project feasibility studies and Business Verification Survey project. In Cameron Highlands, 2 tons of vegetable residues created during shipping and unshipped vegetables brought by farmers per day, are collected and composted. The composted product is acknowledged as a nutrition well balanced fertilizer, with sufficient total carbon and fertilizer ingredients. The product contributes to growth of agritcultural productivity by using them as conditioners in soils which were affected by climate change, as well shifting away from chemical fertilizers.

■ Challenges and Responses in Business Expansion

Cameron Highlands generates 10 tons of food waste per day, but the current compostable capacity is 2 tons per day. Subscriptions will expand the installation of equipment locally and promote the effective use of food residues.

■ Key Success Factors

The success of the project was due to the creation of partnerships among each stakeholder and the establishment of a win-win-win business model for Well Create, businesses that discharge food residues, and farmers.

▲Cameron Highland Compost Center

Related SDGs

■ Business Model of the Project

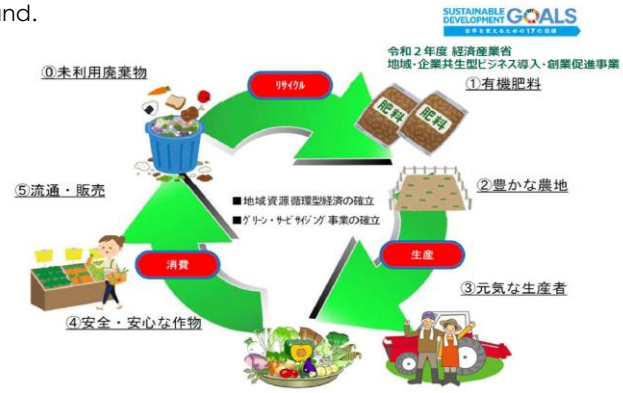
By collaborating with NTT West Group, provides a subscription service for the food waste compost machine to markets and food manufacturing, processing companies, purchase the produced primary fermented product and compost. By utilizing food residues, compost can be sold to farmers at a lower cost than chemical fertilizers. In Malaysia, the company is continuing a PoC project for full-scale commercialization by collaborating with Alam Flora, a conglomerate that aims to enter the local food waste recycling market in the future.

Product & Technology

Local Food Resource Recycling Solutions: Provides necessary equipment including food waste compost machine, to food-related businesses on a subscription service. The operators purchase food residues that have undergone primary fermentation, utilize biochar and poultry manure etc. to recycle them into a high quality organiz compost. It is confirmed that the figures of carbon, nitrogen, phosphorus etc. which are essential to grow crops, improves, time required for growth shortens, crop quantity increases and watering amount reduces by applying the primary fermented materials to soil. The equipment has IoT functions, enabling remote monitoring of the fermentation environment, early detection of failures, and equipment maintenance using maintenance centers. The company also works on traceability through visualization of the recycling loop to ensure safety to consumers, and at the same time works on branding of agricultural products.

Wellcreate also offers carbonization services for food residues. Food residues that are difficult to compost due to their low moisture content are recycled through carbonization. Biochar, with its porous characteristics, enables microorganisms to work more actively and revitalize farmland.

▲Food Residue Fermentation and Decomposition Equipment Offered on Subscription Service



▲Initiatives aimed at building a circular economy and society through the recycling of organic local resources

Challenges for Further Development

While 10 tons of food waste is generated per day at Cameron Highlands, currently 2 tons of food waste is being composted per day. The company aims to increase the amount of food waste processed by expanding the installation of equipment through subscription services. In addition, the company will promote to expand the business area by targeting areas that generate more than 5 tons of food residues per day, to achieve rolling out to all Malaysia. In order to expand the business, the company will need to build a sustainable business model in Malaysia and accelerate understanding of the circular economy.

Profile of Project Company

Established in 2001, the company manufacture, sell, rent and export equipments such as food waste compost machine. By collaborating with NTT West Group, the company builds a sustainable business model by providing a circular- economy-type-society building support service and build the recycling system of food wastes, and also provide subscription service for thefood waste compost machine. In 2021, they launched the county's first PoC of a "mobile recycling car", and leading the market to realize the ciruculation economy.

Inquiry regarding this matter
Contact person: Well Create Inc., Representative Director, Matsuo
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E-mail address: ymatsuo@well-c.co.jp

32. Improvement of agricultural productivity under extreme weather conditions through proprietary technology developed by focusing on plant mechanisms

Ac-Planta Inc. https://ac-planta.com/

Challenges addressed | ⑥Food insecurity

Adaptation Challenge Rising temperatures and droughts caused by climate change are predicted to reduce agricultural productivity and aggravate food shortages.

Contribution Ac-Planta has discovered a mechanism that activates plant tolerance to drought, high temperatures, and salt damage, and has developed a product that can be used to acquire tolerance in all kinds of plants. The company aims to contribute to food security.

Project Detail

■ Background

Country | Uganda, etc.

Ac-Planta has discovered the mechanism of plants producing acetic acid inside when they feel stress of dryness and activate their dyness tolerance. Leveraging this mechanism, the company has developed "Skeepon," a product that can effectively draw out the power of plants. Skeepon can be used to revitalize plants' tolerance to drought, high temperatures, and salt damage.

Currently, Skeepon is only available in Japan and South Korea, but it is also being tested in Uganda, where the agricultural sector has been severely affected by climate change in the past years. When starting the PoC in Uganda, the company has fastened MOU with the National Agricultural Research Organization (NARO) with the backing of government officials, whom had been introduced when the product's practicality had been acknowledged by the Ugandan Ambassador. The product has now been confirmed to be effective with tomatoes and upland rice too, and the company is considering of utilizing them with corns, soybeans, fruits, and forest restoration in the future.

■ Challenges and Responses in Business Expansion

The safety of the product has already been confirmed. For example, they have been approved in California; the most heavily regulated state in the U.S. However, there is still a possibility of restrictions by food additive regulations when rolling out to overseas. For this, the product is expected to be converted to organic in the future, which will allow it to expand to more countries.

■ Key Success Factors

While the majority of the contributions to climate change adaptation in the agricultural sector is to resolve challenges by installing the product, "Skeepon" is a simple solution which effect sustains over 1 month after using them only once. It is also a product which can achieve increase in the plants productivity, without a large investment in initial and maintenance cost.

▲1)With the administration of Skeepon, the damage caused by high temperature and dryness was reduced, and it went smoothly.
Grown maize and 2) planting test in Ugandan farmland

Related SDGs

■ Business Model of the Project

For business development in Uganda, we are considering a business model in which Skeepon is sold to farmers through the National Agricultural Research Organization of Uganda (NARO), since NARO, which is conducting the joint demonstration project, has a sales function and can directly access local farmers.

Product & Technology

Biostimulant Skeepon: The world's only product for agriculture, which leverage the the plant epigenetics technology that can strengthen the plant's tolerance to drought, high tempretures and solt damage by utilizing the mechanism of plants to produce acetic acide inside when lacking water, and activate the tolerance to dryness. The product has been proved to enable agriculture in environments where it is difficult to cultivate crops, as well as eliminate the need for fertilizers under normal environment, reduce the amount of watering, reduce uneven growth, and speed up production speed.

The main features are as follows:

- Can be used for a variety of type of plants
- Significant enhancement of plants' tolerance to drought, high temperatures, and salt damage
- Reduces water and fertilizer usage while at the same time ensuring consistent crop production
- Safe and eco-friendly for plants, animals, and the environment

▲Skeepon (1l bottle sold)

Challenges for Further Development

By 2028, the company aims to achieve approaching food security for 1 billion people, and save water by 1.7 billion ton, with new plant science technologies such as “Skeepon”. In addition, they are seeking to create new industries and jobs by driving SDGs solution projects leveraging the product. To expand the business, they are also considering utilizing JICA projects and external supports.

Profile of Project Company

Established in 2018, the company's goal is to resolve the issue of decreasing agricultural productivity and food shortage caused by abnormal weather, with the power of plant science as the Institute of Physical and Chemical Research-approved venture. The company conducts research, development, production, and sales of biostimulants that can improve productivity while providing tolerance to drought, high temperature, and salt damage, etc. Received many awards and competitice grants including the Research Encouragement Awards 2018, RIKEN Institute, Japan, and the Award for Excellence, JA Accelerator 2019.

Inquiry regarding this matter
Phone: +81-3-4405-1625
E-mail address: info@ac-planta.com

33. Preventing spread of infectious disease associated with climate change

Sumitomo Chemical Co., Ltd. https://www.sumitomo-chem.co.jp/

Challenges Addressed | ⑧ Spread of infectious diseases

Adaptation Challenge Rising temperature associated with climate change is feared to transform and expand the habitat of infectious disease vector and host organism, leading to the outbreak of infectious diseases and increase in the number of patients in new territories.

Contribution Sumitomo Chemical Co., Ltd.'s "Integrated Vector Management" based on the strong technology of the Company serves as adaptation measure in the field of public health and sanitation.

Project Detail

■ Background

Country | Ethiopia, Ghana, Indonesia, Philippines, Brazil, Costa Rica, etc.

"Olyset™ Net", a bed net treated with insecticide against malaria, was developed in an attempt to help contain the serious outbreak of malaria in Africa by applying the conventional technology used for window mesh screen in factories as bug shield. In response to the World Health Organization (WHO) recommendation of mosquito net treated with insecticide as opposed to its conventional approach of insecticide spraying, the Company applied the product with WHOPES, World Health Organization Pesticide Evaluation Scheme in 2000, and was granted its recommendation as the world's first long lasting insecticidal net. Since then, the Company moved forward to an integrated solution as the "Integrated Vector Management" in collaboration with a range of technologies including indoor residual spray, space spray and larvicide, etc. which protect people from disease-carrying insects in various situations covering day and night, indoor and outdoor space. The company offers its products widely in Africa, Southeast Asia, and Latin America.

■ Challenges and Responses in Business Expansion

Technology transfer to production factories around the world and strict quality control to meet WHO standards.

Addressing mosquitoes that have developed resistance to insecticides. Continuous research and development to ensure effectiveness has led to the market introduction of new products like "Olyset™ Plus" and "SumiShield™ 50WG".

■ Key Success Factors

"Olyset™ Net" was one of the first to respond to the WHO's policy change on mosquito nets for malaria prevention and to receive its recommendation, and the Company's products offer including advices on regulatory process to developing country governments, led to its worldwide adoption.

■ Business Model of the Project

Collaboration with public bodies: Based on recommendation by international organizations, such as WHO and developing country governments, "Olyset™ Net" is supplied to more than 80 countries through international organizations including The Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund) and United Nations Children's Fund (UNICEF).

Local production and research system: "Olyset™" series products are manufactured locally in Tanzania by our partner company, in addition to the production base in Asia, contribute to local economic development by creating jobs and maintain production capacity that can respond to demand. Utilization of related research facilities in Tanzania and Malaysia contribute to the development of local researchers as well as to the actual verification of product effectiveness.

▲ Summary of Vector Management

Related SDGs

Product & Technology

The Company provides solutions to a wide range of infectious diseases through its knowledge of its existing business, insecticidal actives, and an assortment of products with its extensive formulation technologies. The Company evaluate the number of people which its vector control products protect from infectious diseases as one of key performance indicators (KPIs) (440 million people in FY2022).

Long-lasting insecticidal net (Olyset™ series): To counter malaria, the product uses "controlled release" technology in which a pyrethroid insecticide is incorporated into polyethylene, allowing the chemical to gradually migrate to surface of the net fibre. No need for re-treatment and long-lasting insect control. "Olyset™ Net" and "Olyset™ Plus" with enhanced efficacy against insecticide-resistant mosquitoes are available. The company also sells insecticidal nets made with same technology as "Olyset™ Pro" , which are installed in school windows to protect children from dengue fever.

Indoor residual spray with new mode of action (SumiShield™ 50WG): This is an indoor residual spray containing clothianidin as the active ingredient to counter malaria. It is highly effective against malaria vector mosquitoes that are resistant to conventional pyrethroid and carbamate residual sprays and has excellent residual efficacy.

Space Spray (SumiPro™ EW): To counter dengue and zika, it contains metofluthrin (Eminence™/SumiOne™), which has high knockdown activity against mosquitoes, and *d,d,trans*-cyphenothrin (Gokilaht™ -S), which has excellent lethal effect, and PBO, a synergist, to increase the efficacy. The formulation is suitable for both of indoor and outdoor spraying.

Larvicide with long-lasting residual effect (SumiLarv™ 2MR): It inhabits the hatching of mosquito pupae into adults to counter dengue and zika. Superior long-term residual efficacy compared to conventional products.

▲Child elated with "Olyset™ Net"
Photographs © M.Hallahan

▲ "Olyset™ Pro" in the school of the Philippines

▲ SumiShield's granular form is easy to transport and use; just mix with water

Challenges for Further Development

Vector control business in general requires constant streamlining to maintain business due to the large number of competing products and the difficulty of effective protection by patents. There are also technological issues that need to be resolved, such as the insecticide resistance. While maintaining business viability with the brand that has been established over time and the know-how gained from operating the vector control business for many years, the company will deliver to the world infectious disease control products with superior effectiveness, quality, and safety based on its technological capabilities as an integrated chemical company.

Profile of Project Company

Since its founding in 1913, when the company began extracting sulfur from ore to produce fertilizer to overcome smoke pollution from exhaust gas during copper smelting and to increase agricultural production, it has continued its efforts to create economic activity and social value in an integrated manner. Today, together with more than 100 group companies, the company globally supplies products that support a wide range of industries and people's daily lives. The company holds the top share of the world market for raw materials for household insecticides.

Inquiry regarding this matter
Contact person: Environmental Health Division, Health & Crop Sciences Sector
Contact: https://www.sumitomo-chem.co.jp/contact/product/

34. Securing sufficient and clean water through ion exchange membrane

AGC Inc. http://www.agc.com/

Challenges Addressed | ⑤ Water insecurity

Adaptation Challenge Issues surrounding water have increasingly become serious worldwide caused by water shortages due to drought and other meteorological phenomena as well as rise in salt content in underground water. At the same time, drainage regulations have been tightened to protect the surrounding environment and secure the quality of water.

Contribution AGC Inc.'s water purification system, where water is purified and desalinated using ion exchange membrane, will ensure stable supply of water suitable for agriculture and drinking and contribute to better health and sanitation of the surrounding environment and residents.

Project Detail

Country | Israel, China, India

■ Background

In response to enquiry from an Israeli public organization plagued by high level of salt content in well water exceeding World Health Organization (WHO) benchmark in the late 1990's, the water purification system was installed in more than 10 sites. Subsequently the demand rose in China where drainage regulations have been tightened and the system was introduced together with ZLD (Zero Liquid Discharge) facilities to purify water and recover valuables such as sodium sulfate at industrial plants. Currently, the system has been installed in rural areas of India, where water shortages and groundwater contamination are worsening due to drought, and a system that can be maintained and managed locally by lecturing engineers on maintenance methods has been established, and further business development is being pursued.

■ Challenges and Responses in Business Expansion

Despite being in an area with different customs from Japan and a less developed communication infrastructure, they successfully implemented the system through establishing a trusting relationship with the local engineers.

■ Key Success Factors

The products have been widely accepted by local communities due to the customized system that meets the local requirements and regulations. In addition, by cooperating with good partners and including the perspective of solving social issues in business development, the company has succeeded in expanding its business to developing countries.

▲Electro Dialysis Purification System

Related SDGs

■ Business Model of the Project

AGC has designed the electrodialyzer at the heart of the system and exports the core technology ion exchange membrane. The electrodialyzer and accessory units are manufactured by local engineering partners and delivered as a system to the clients such as government agencies and private companies.

Product & Technology

Electro Dialysis Purification System: The ion-exchange membrane "SELEMION™" developed by AGC and the action of electricity separate and desalinate ionic substances dissolved in water, such as fluorine and so on, which are harmful to the human body, thereby ensuring safe agricultural and drinking water suitable for daily use. The features of the system are as follows

・Resource-saving: Ion exchange resin used in soft-water equipment usually requires regular regeneration process to remove hard substances built up during use, to recover performance. This process is not needed in this system, therefore the dosage of medical agent can be cut significantly.

・Energy-saving: Water is utilized more efficiently than the conventional RO (Reverse Osmosis) process and power consumption is less as high-voltage pump is not required.

・Countering unstable power environment: Powered by direct current and leveraged on solar panel system, the system can be installed on a site where power source is limited.

▲Bottled drinking water

For example, for Israel, we provide high-performance systems made in Japan, while for India, a local partner company undertakes the main manufacturing and localizes as much as possible to reduce the cost to one-third, thus enabling us to provide systems tailored to local needs.

Challenges for Further Development

The Company strives to raise cost efficiency through various measures, such as the creation of value chain in China based on the recovery of valuable materials and improvement of local production ratio which will remain a key for greater cost competitiveness for future development. While the conventional RO process is common in India, further development will be possible once the electrodialysis technology is officially recognized by the Indian government through technical registration.

Profile of Project Company

The AGC Group operates globally in approximately 30 countries and regions with AGC Inc. as its core. Backed by the strengths of world-class technology and know-how cultivated over many years, the Company provides building materials, automotive materials, display glasses, electronic components, chemical products, pharmaceutical & agrochemical related products and services and ceramics to customers in a wide range of industries.

Inquiry regarding this matter
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35. Improvement of water environment through wastewater treatment systems

Sanicon Co., Ltd. http://www.sanicon-group.com/
Accrete Co., Ltd. https://www.accrete-inc.com

Challenges Addressed | ⑤ Water insecurity, ⑦ Air, water & land-based pollution

Adaptation Challenge Water pollution and its shortage frequently caused by climate change pose threats to regional water resources and industrial development.

Contribution Water purification technology by Sanicon Acryte will contribute to the supply of safe and secure water to developing countries where water pollution is increasing.

Project Detail

Country | Laos

■ Background

Sakai City and Binh Dinh Province of Vietnam have enjoyed a long-term exchange, such as interaction between local companies through Consulate-General of Vietnam in Osaka. The Provincial delegation, with perspectives to develop economically while protecting environment, visited the water purification and treatment facilities that Sakai City-based Sanicon Group has planned, designed, installed and maintained, which led to the provision of guidance on maintenance and operation in the Province. Among them, CONSTRUCTION JOINT STOCK COMPANY 47 (CC47), a major local company in the growing tourism industry was planning a water purification project for well water in their hotel premises to ensure the supply of safe water at their own hotels and was eager to introduce the technology of Sanicon and Accrete. Thereafter in May 2017, well-water purification facilities were introduced to Seagull Hotel by leveraging on the water supply knowhow and water purification technology, which enabled the supply of safe and secure water for tourists and paved a way for sustainable development of the local economy. Since 2017, through JICA's feasibility study and dissemination demonstration project, we have been promoting a wastewater treatment project using recycled carriers (KIDS) to Laos. In Laos, wastewater is not properly treated, and the surrounding environment is deteriorating due to wastewater overflows caused by heavy rainfall. At the pilot site, the University of Laos, wastewater was discharged well above the standard value, and it was recognized that the KIDS wastewater treatment system is expected to be effective in purifying the wastewater. Together with its counterpart, the Department of Water Supply (DWS) of the Ministry of Public Works and Transportation, KIDS is promoting the technology of the wastewater treatment system through the demonstration and is building a foundation for business development.

■ Challenges and Responses in Business Expansion

It was forced to revise its plan due to the deteriorating business conditions of local companies and difficulties in procuring materials during COVID-19. On the other hand, wastewater treatment technology is attracting attention locally, and the company aims to commercialize the technology by building a business model through collaboration with local companies through a demonstration project.

▲The view of the area with rising sea level

■ Key Success Factors

In accepting the technology, the company provided simultaneous and continuous guidance on construction and maintenance management, which played a major role. In Laos, the company aims for full-scale adoption of the technology by appealing the low-cost initial introduction and providing comprehensive operation services, including maintenance and water quality management, in terms of running costs.

▲Seagull Hotel along beautiful coastline

Related SDGs

■ Business Model of the Project

In developing business in Laos, Accrete will design the equipment and the partner company will conduct sales. In the future, while Japan will provide the core technology and guidance, the local partner company is considering a business model in which materials and equipment that can be procured locally, as well as technical support such as local management, will be handled by the local partner company.

Product & Technology

UF membrane (Ultrafiltration membrane) water treatment: The treatment successfully eliminates germs and viruses. By creating parallel flow to the membrane surface, turbid substances and colloids in the water supplied to the membrane are reduced to prevent them from accumulation on the membrane surface while being filtered which is called the cross-flow filtration method. As compared to more common and affordable RO membrane (reverse osmosis membrane), the method enables reuse of 95% of the water to be filtered with greater power efficiency of the pumps and longer durability and thus is fit for use in developing countries. Also, UF membrane is capable of leaving hardness and ion levels at the optimum level so local flavor is maintained while safety is assured, as opposed to RO membrane that removes salt and ion to the extreme.

Recycling carriers (KIDS): Purify wastewater from offices and homes up to the standard value. As a result, maintenance and management costs for sludge treatment can be reduced, as well as the cost of operation, since no chemicals or other inputs are required. In addition, KIDS carriers can be used stably for a long period of time and are easy to maintain.

▲Water purification equipment

▲ Wastewater treatment facility with recycling carriers (KIDS) introduced in Laos

Challenges for Further Development

Demand for the KIDS wastewater treatment system, which is easy to maintain, inexpensive, and effective, is expected to increase in developing countries that lack sufficient wastewater treatment technology and financial resources and are severely affected by climate change. Through JICA's ongoing demonstration project, the company aims to develop a full-scale business in Laos by identifying partner companies and potential customers.

Profile of Project Company

Since its establishment in 1970, the Sanicon Group has focused on the construction and maintenance of water supply facilities and wastewater treatment facilities, mainly septic tanks. In 1997, we began technical cooperation with Vietnam, and in 2006, we established Accrete Co., Ltd., which aims to build optimal systems using various water treatment systems. The company's corporate philosophy is to pursue optimization for securing, purifying, and circulating limited water resources that are indispensable for everyday life, and to aim for the preservation of a sustainable global environment. Through its domestic and international business activities, the company is engaged in activities to protect human health and pursue safety and security.

Inquiry regarding this matter
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36. Realization of stable water treatment by underwater mechanical aerator and agitator

Hanshin Engineering Co., Ltd. http://www.hanshin-pm.co.jp/

Challenges Addressed | ⑤ Water insecurity

Adaptation Challenge Exhaustion of water resource due to expansion of the desertification and drought under climate change is a serious issue worldwide.

Contribution Hanshin Engineering realizes highly efficient and stable water treatment through technology of underwater mechanical aerator and stirrer. Especially, by introducing the technology in developing countries with serious climate change impact, the technology supports securing water resources and stable provision of water as well as improvement of regional living environment and health / sanitation.

Project Detail

■ Background

Country | Malaysia, etc.

Hanshin Engineering Co., Ltd. provides water treatment technology such as underwater mechanical aerator and stirrer in the public works of Japan. The underwater mechanical aerator and stirrer has been has installed at some 1,000 locations with some 11,000 facilities, which is approximately half of the water treatment plants in Japan. Also, since the market in Japan became matured, business started in 2010 in Southeast Asian countries where are expected for economic growth in near future. So far, the underwater mechanical aerator and stirrer have been has installed in the wastewater treatment facilities in Chine, Taipei, Thailand, Malaysia, Indonesia, the Philippines.

(1) Advanced wastewater treatment and resource recycling in palm oil factory in Malaysia

The underwater mechanical aerator and stirrer was introduced in the wastewater treatment plant of the palm oil factory in Malaysia through the Pilot Project Supplementary Budget Scheme for Small and Medium Enterprises Overseas Expansion Support Project. The technology accomplished treated water quality at BOD20mg/L. In addition to upgrading the wastewater treatment, it contributed to resource recycling through carbonization of sludge, conversion to fuel, and composting.

▲Wastewater treatment plant in palm oil factory in Malaysia

(2) Activities in rubber glove manufacturing plant in Malaysia and aquaculture facilities in Thailand

"Development of energy-saving underwater mechanical aerator and agitator for the wastewater treatment system in ASEAN region" was implemented under the Subsidy Scheme for Carbon Dioxide Emission Control (Project for Creating Innovation of Low-carbon Technology for Developing Countries) in FY2017 and FY2018. Under the project, the following are examined; improvement of performance of the products, which is the improvement of transfer performance of oxygen as air supply function, long life of the products through improvement of motor bearing and development of motor cooling mechanism, and stable use of the products with development of alien substance entrapment prevention mechanism.

■ Challenges and Responses in Business Expansion

It is important to accurately grasp the needs of the field and develop products in line with those needs. From the initial stage, the company always visits the field to directly confirm the needs.

■ Business Model of the Project

Profitable network is structured though cooperation with local governments, private companies and other stakeholders. Also, approaches to end users in both overseas and Japan are promoted by cooperating with an engineering company who well knows the situation of local water treatment.

Related SDGs

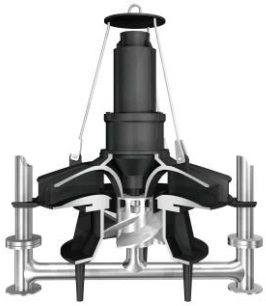
■ Key Success Factors

Unique quality service can be provided with high precision product development based on technology and know-how, and abundant achievements and experiences in Japan, which have been accumulated for more than half a century. Demand of water treatment technology is increasing in the developing countries due to serious depletion of water resources with effect of climate change. Highly efficient and stable water treatment technology like "Aquarator®" can respond to such demand. International business is successfully utilizing the support project by Team E-Kansai in addition to public financial scheme such as commissioned projects of JICA project and subsidiary scheme of GEC. The project has been successful because of the introduction of products through public projects, the effectiveness of advertising, and the network of contacts formed through frequent local visits and the development of products that meet local needs, as well as the trust and credibility gained as a result of these efforts.

Product & Technology

Underwater mechanical aerator and stirrer "Aquarator®" are functionable for both aerobic and anaerobic tanks. In the aeration process, the air which is supplied from blower is refined through the proprietary structure and gas-liquid mixing solution is spread all over the reaction tank. Some features are shown below.

- High efficiency of oxygen dissolution and high energy efficiency (Energy-saving at max. 30% is realized by renewing from existing air diffuser to the Aquarator®.
- Since the sludge does not remain at the bottom of tank with good condition, wastewater treatment process become stable.
- Maintenance can be completed quickly and on-site, with no need to remove sludge from the tank for cleaning, etc.
- The running costs are significantly low.



▲Aquarator® by Hanshin Engineering Co., Ltd.

▲Before aeration

▲Just after aeration

▲Under aeration

Challenges for Further Development

In the future, we will strive to enhance our sales and manufacturing systems so that we can provide high-quality products, technologies, and services by reestablishing our sales network through the formation of further human networks. In particular, the challenge will be how to increase the number of public works projects that are expected to introduce a large number of machines.

Profile of Project Company

Hanshin Engineering was established in Nov. 1950. Head office is located in Osaka City. Manufacture and sales of gear reducers, equipment for river facilities, equipment for water treatment, and equipment for industrial equipment. After the underwater mechanical aerator and stirrer "Aquarator®" was developed in 1975 first in the world, its manufacturing and sales were started. A number of the "Aquarator®" have been installed in Japan, and currently there are distributors in China, Taipei, Malaysia, Thailand, and Indonesia.
Hanshin Engineering recognizes that conservation of global environment is the most significant issue common to mankind; therefore, many of our corporate activities aim to protect the global environment and contribute to society on environment. Especially, Hanshin Engineering contributes to the environmental measure toward the climate change through development and sales of water treatment and water regulation machinery.
Hanshin Engineering will deepen cooperation with local partner companies, improve production system such as increase of production amount and shortening of production duration, and actively promote international business.

37. Addressing "water pollution caused by floods" and "decrease in water resources"

Yamaha Motor Co., Ltd. https://global.yamaha-motor.com/

Challenges Addressed | ⑤ Water insecurity, ⑦ Air, water & land-based pollution

Adaptation Challenge Increase in floods associated with climate change has aggravated pollution of water source, raised the number of sick people due to poor health, and hindered socioeconomic growth.

Contribution Introducing "Yamaha Clean Water Supply System", a small-sized water purifier developed by Yamaha Motor Co., Ltd. as an adaptation measure in villages of Asia and Africa will contribute to supporting resilience building of the regions.

Project Detail

■ Background

Country | Indonesia, Madagascar, Senegal, Benin etc.

In the 1980s, Yamaha developed and sold its own household water purification system to purify tap water after receiving complaints from the families of expatriates working at a motorcycle manufacturing plant in Indonesia that the tap water was brown and smelled of iron. In 2000, Yamaha began development of its current system, which uses river water and other resources. After conducting demonstration tests, Yamaha began selling the Yamaha Clean Water System to villages in 2010. To date, a total of 50 units have been installed in 16 countries in Asia and Africa.

■ Challenges and Responses in Business Expansion

Yamaha has faced some difficulties in import customs clearance when shipping Yamaha clean water systems, such as dealing with the laws and regulations of various countries, but the company is expanding the number of installations by utilizing the knowledge of local distributors.

■ Key Success Factors

The barriers to introduction is overcome by advance education on sanitation and maintenance procedure in addition to realizing low running cost and easy maintenance.

Realizing co-benefit by encouraging self operation by local partners through setting up "water committees". The committee would contribute to creating local jobs through launching new businesses such as water sales business and mobile phone charging service in areas with no grid electricity but equipped with solar panels.

By establishing such a system that contributes to the overall social and economic development of the region, the company has achieved the creation of a sustainable business model, and is gaining recognition from African stakeholders and others.

▲Yamaha Clean Water Supply System

▲A happy child

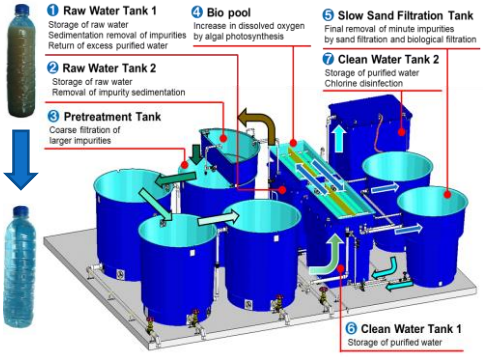
Related SDGs

■ Business Model of the Project

The system has been introduced by local governments and NGOs to medical and educational facilities and rural areas in countries vulnerable to water pollution such as Indonesia, Madagascar, Senegal and Benin, drastically reducing the outbreak of diarrhea, fever and other illnesses. The system has freed residents of their water drawing labor and enabled them to shift their activities toward production and learning. The system has led to creation of new business , such as water delivery and ice making in some cases.

Product & Technology

"Yamaha Clean Water Supply System"(YCW): The "slow filtration" method, which uses sand and gravel to purify water, has been adopted to reduce environmental impact and energy consumption. Surface water pumped in by a pump is passed through a "filtration tank" lined with sand and gravel to remove mud and debris, and photosynthesis by algae naturally occurring in the tank increases the concentration of dissolved oxygen in the water and activates microbial water treatment. Since there is no need for coagulants or filter replacement, the system does not require advanced technology or costs for operation and maintenance, and can be operated and managed independently by local residents. The system can be introduced even in non-electrified areas by adding solar power generation equipment as needed, and will contribute to solving water problems in developing countries, especially in small villages where sufficient installation area can be secured.



▲System Outline

Challenges for Further Development

Although the introduction of these systems is continuing, with Indonesia having the largest number of systems installed (15 systems in total), there are still many people in Africa and Asia who do not have access to safe water. In order to meet their needs, cost reductions and shorter delivery times will be a challenge.

Profile of Project Company

Yamaha Motor Co., Ltd. was set up in 1955 as a motorcycle manufacturer. Since then the company not only pursues values in existing markets, but it has engaged in "Social Value Creation Business", represented by Yamaha Clean Water Supply System, which creates new markets through effort to resolve social issues taking sustainable economic growth and environmental preservation into consideration. The company has entered into African market in the 1960s and launched an array of projects including motorcycle delivery of vaccines and doctors, promotion of employment through the development of motorcycle taxi business, guidance on the method of fishing and management of catch for modern fishery while introducing outboard motors. The company also promotes local manufacturing of fishing boats made of FRP (Fiber-Reinforced Plastics) as a replacement for wooden ones in a bid for industrial development, job creation, safe operation, and minimizing deforestation, all of which have contributed to the development of African nations. "Yamaha Clean Water Supply System" won the Good Design Award 2013. Our work to encourage the use of safe water at villages with a Yamaha Clean Water Supply System using *kamishibai* storytelling (Japanese-style storytelling using picture cards) was recognized with an award from the committee of judges at the 8th Good Life Awards put on by Japan's Ministry of the Environment.

Inquiry regarding this matter
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38. Improvment of residential environment and mitigation of heat island phenomenon by thermal barrier coarting

Miracool Co., Ltd. https://www.miracool.jp

Challenges addressed | ④Extreme temperature changes

Adaptation Challenge Due in part to rising temperatures caused by global warming, room temperatures inside buildings made of galvanized steel sheet roofs, which are often used for building roofs in developing countries and have no insulation effect, are getting hotter, deteriorating the living and learning environments.

Contribution Miracool reduces the temperature of the roof surface by coating the roof with thermal barrier paint, and contributes to the improvement of indoor comfort and the mitigation of the heat island phenomenon by reducing the release of heat from the roof.

Project Detail

Country | Philippines, Nepal, Kenya, etc.

■ Background

At the Second International Conference of Experts on Environmental Technology held at the Fukuoka Headquarters of UN-Habitat in 2010, various advanced technologies of Japan were introduced, and Miracool was selected as the only thermal barrier coarting. After the conference, Miracool was selected by UN-HABITAT as a pilot project in Sorsogon City, Philippines, and in 2011, Miracool was installed in an elementary school, a community center, and small houses. After the installation, city officials collected temperature data, and the results showed that the room temperature was reduced by up to 12.1°C.

In 2022, with support from the Government of Japan and UN-Habitat, Miracool was installed on the roof of a school in the Gadhawa district of Nepal, where the temperature reached 40°C. The room temperature in the classroom, which was over 40°C before the installation, was reduced by about 8.5°C after Miracool's installation.

Miracool has also been adopted in a number of other countries, including Kenya and Vietnam, contributing to the improvement of hot environments in buildings.

■ Challenges and Responses in Business Expansion

The local contractors apply the coating, but it is difficult to control the required amount of coating. Also, the local contractors are carefully informed that sufficient effect cannot be expected unless the specified amount of coating is applied.

■ Key Success Factors

When performance comparison with other manufacturers was carried out in Vietnam, Miracool was evaluated for its high quality, as it prevented the adhesion of dirt and kept the surface temperature low, which led to additional orders from the local market.

▲Morning meeting at school in Nepal after Miracle painting completed

Related SDGs

■ Business Model of the Project

For UN-Habitat projects, Miracool exports thermal barrier coarting and UN-Habitat commissions local contractors to paint.

Product & Technology

Heat barrier coating Miracool: This product can prevent the rise of room temperature in a building by exerting a heat barrier effect by preventing the temperature rise due to the high reflection of sunlight, reducing the heat flowing back to the room due to the low thermal conductivity of the coating film, and cooling the surface heat due to the high long-wave emissivity. Reflectance 10 years after painting also retains more than 80%, making it highly durable and effective for a long period of time.

Particularly in countries and regions with high solar radiation and hot weather,with high electricity costs, and buildings with no or thin insulation, painting with Miracool can greatly improve the thermal barrier environment of buildings.

Paving road paint on road surfaces also contributes to the mitigation of the heat island effect, and it has been estimated that painting on roads in 23 wards of Tokyo will reduce temperatures by more than 0.8°C.

Miracle AQ Clear: When used after Miracool coating, the self-cleaning function of the ultra-fast hydrophilization effect prevents the adhesion of pollutants in the air that inhibit the solar radiation reflection function, and makes the Miracool product with high anti-pollution property even more stain-resistant.

▲Effect of Miracle AQ Clear Self-Cleaning Due to Superhydrophilicity

Challenges for Further Development

It has been adopted as a survey project for needs verification by JICA, and is conducting needs verification for local development of Miracool in the Philippines. Examine the fit between the needs and the product, as well as the sustainability of the business and the establishment of the business model.

Profile of Project Company

Established in 2005 as a specialist manufacturer of thermal barrier coatings. Aiming at the construction of a sustainable society in three factors, economic, social and environmental, for all countries and regions including developing countries, thermal barrier paints for buildings, roads and industrial products are proposed according to the application and place of use. Awarded the Best Innovation Award by the World Road Association (PIARC) and the World Road Achievement Award by the International Road Federation (IRF) in 2009. The company will surpass 10,000,000 m2 of total coated area by 2023.

Inquiry regarding this matter
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39. "GUARD OUR FUTURE PROJECT" TO PROTECT FUTURE LIFE FROM MOSQUITOES

Kao Corporation https://www.kao.com/jp/

Challenges | ⑧Spread of infectious diseases

Adaptation Challenge Mosquito-borne diseases kill about 1 million people a year, and global warming is expected to further expand the areas affected by dengue fever, making measures to prevent the spread of damage a challenge.

Contribution Kao has launched the GUARD OUR FUTURE PROJECT to protect future lives from mosquitoes, and is contributing to the prevention of dengue fever infection through industry-academia-government collaboration and a new concept of insect repellent cream.

Project Detail

Country | Thailand

■ Background

In Thailand, about 40% of people affected by dengue are children aged 14 years or younger, who are routinely at risk of mosquito bites and dengue. The Thai government has implemented measures such as removing bowhura and spraying insecticides over the area, but it is also important to prevent individuals from being bitten by mosquitoes. Kao launched the GUARD OUR FUTURE PROJECT in 2022 as an effort to protect future lives from infectious diseases caused by mosquitoes.

This project involves industry-academia-government collaboration to conduct cleanup activities to reduce mosquitoes, hold dengue fever awareness events, provide special classes at schools (next-generation education), and build a model to predict dengue fever epidemics. The company also developed an insect repellent cream that uses technology to prevent mosquito bites by creating a skin surface that mosquitoes dislike, and began selling the cream in June 2022. Currently, the company is continuing its activities on both the axis of industry-academia-government collaboration and insect repellent creams, with an eye to expanding to Southeast Asian countries, and is also continuing its research and development, including the development of new technologies to eliminate mosquitoes without using insecticidal ingredients.

■ Challenges and Responses in Business Expansion

In Thailand, it is not customary to use insect (mosquito) repellents on a daily basis due to concerns about the effects of the volatile repellent ingredient DEET. Therefore, Kao focused on the property of silicone oil that prevents mosquitoes from stopping on surfaces coated with it, and launched a DEET-free insect repellent product from Bioré, a brand that protects the skin. By encouraging the use of insect repellents by those who have been reluctant to use them due to concerns about their effects on the body and the comfort of using them, Kao will be able to save many lives.

■ Key Success Factors

By developing a new anti-mosquito technology that does not use the repellent DEET, Kao succeeded in developing an insect repellent cream that is easier to use on a daily basis. In addition, by implementing community activities and other soft activities such as education for the next generation, the project is enhancing the effects of the project by encouraging people to change their consciousness.

▲Field Survey

Related SDGs

■ Business Model of the Project

Through education and awareness-raising activities in collaboration with the local government and other organizations, the project aims to promote understanding of the importance of avoiding mosquito bites in order to protect oneself from dengue fever, and to encourage people to use insect repellents on a daily basis.In areas where economic disparity makes business difficult but where the damage is serious, the project aims to build a sustainable business model in which the proceeds from sales are used to donate insect repellents to the affected areas. To achieve this, it is important to expand business, and the company is strengthening sales through initiatives and promotions with supply chains that share the concept.

Product & Technology

Biore GUARD Mos Block Serum: Insect repellent cream free of volatile repellent ingredient DEET. By applying the property that mosquitoes do not attach to surfaces coated with silicone oil, Kao has developed an easy-to-use insect repellent cream that does not use chemical repellent ingredients. Recently, the number of mosquitoes resistant to insecticidal ingredients has been increasing, but the insect repellent effect of this Kao insect repellent cream is thought to be unaffected.

RooTan: An app developed by Thailand's National Research Center for Electronics and Computer Technology (NECTEC) that allows users to easily obtain health-related information. Kao is working with NECTEC to develop a dengue prediction model. In the future, Kao will utilize the information provided by app users to sequentially develop information to change consumer behavior, such as the number of mosquitoes and dengue fever risk forecasts, with the aim of achieving zero dengue fever deaths through the establishment of society-wide dengue fever prevention activities.

▲Biore GUARD Mos Block Serum Product Image

Challenges for Further Development

The GUARD OUR FUTURE PROJECT initiative will be expanded globally, starting with Southeast Asia, where dengue fever is a serious problem. In Southeast Asia, the lack of sufficient knowledge of mosquitoes among consumers is one of the factors contributing to the spread of the disease. Therefore, in addition to selling insect repellent cream, it is necessary to simultaneously promote awareness-raising among consumers. In Thailand, through the functional enhancement of the RooTan application, the company aims to raise consumer awareness by predicting dengue fever, immediately identifying risk areas, and encouraging individual avoidance behavior.

Profile of Project Company

Established in 1887. With the goal of "creating a prosperous and harmonious world," the company develops products that make people's daily lives more comfortable, beauty care products, products in the functional food field, and industrial product businesses, Kao has been highly evaluated for its efforts in the ESG field, including selection for inclusion in the MSCI ESG Leaders indexes and a Triple-A rating from CDP.

Inquiry regarding this matter
Japanese: Kao website Contact https://www.kao.com/jp/support/
English: corporate_pr@kao.com

40. Indoor air purification and reduction of infectious disease-carrying mosquitoes through mosquito air purification

Sharp Corporation https://jp.sharp/

Challenges addressed | ⑦Air, water & land-based pollution, ⑧Spread of infectious diseases

Adaptation Challenge In Southeast Asia, air quality is deteriorating due to haze and other problems caused mainly by rainforest and peat fires. In addition, the habitat of mosquitoes, which carry infectious diseases that cause more than 700,000 deaths annually, is expanding due to global warming.

Contribution Sharp has developed a mosquito chatcher air purifier that adds a mosquito catching function to its proprietary Plasmacluster air purifier technology, thereby helping to improve people's living environment by reducing the risk of air pollution and infectious diseases.

Project Detail

■ Background

Country | Malaysia, India, etc.

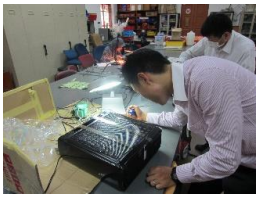
Sharp, which manufactures and sells air purifiers that utilize its proprietary plasmacluster ion technology, has developed an air purifier which also captures mosquitos; inspired by a comment from a local employee in Malaysia, one of the countries most affected by mosquito-borne infectious diseases, "Air purifiers suck the air. Can the product also collect mosquitos?". The product's mosquito catching effect had been increased by leveraging the habit of mosquitoes being attracted to UV light and prefer black color and confined spaces. The product was tested on more than 10,000 mosquitoes over a two-year period in collaboration with the Malaysian Medical Research Institute (IMR) under the Malaysian Ministry of Health (MOH), and the results showed that it could collect up to 91% of house mosquitoes(Culex), 73% of striped mosquitoes(Aedes), and 72% of housefly. After launching the product in 2015, the product is now available in a total of 12 countries and regions, including Southeast Asia and South Asia.

■ Key Success Factors

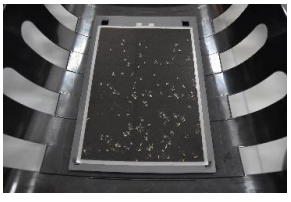
The world's first mosquito catcher air purifier was developed through a deep understanding of local problems, the cooperation of local experts, and the ability to combine new and existing products in a frictionless manner.

■ Challenges and Responses in Business Expansion

Since it was the world's first mosquito-collecting air purifier, a fair amount of promotion was necessary to publicize the effect of the product. To fulfil the dedication to prove the effect in an area where mosquitoes are causing real issues, the company has conducted numerous tests and specification reviews with local experts, which in turn helped to appeal to the local market of our credibility. In addition, the company succeeded in expanding sales by transforming the product from a good that is used during the dry season when the air is polluted, to a product which is used throughout the year including the rainy season when the number of mosquitoes increase.



▲Counting mosquitoes collected in the test(at a laboratory in Malaysia)



▲Mosquitoes collected with an adhesive sheet of mosquito suspension

Related SDGs

■ Business Model of the Project

In Southeast Asia, where air pollution problems such as haze occur during the dry season and infectious diseases caused by mosquitoes occur during the rainy season, mosquito air purification reduces air risks throughout the year, and is expanding sales by promoting value that cannot be replaced by mosquito coils or insecticide sprays.

Product & Technology

Mosquito Catcher Air Purifier: The world's first "mosquito-catching air purifier" that combines air purification and mosquito catching functions.

The main features are as follows:

- Safe mosquito catching function that leverages the mosquito's habits and the air purifier features: Leveraging the mosquito's habits of being attracted to UV light, prefer black color and rest in confined space, the air purifier has (1) UV LED which mosquitoes likes (2) use black as the body color (3) provide a hole in the size of which the mosquitioes like, and at the same time do not block the air purifier's fuction (4) suck nearby mosquitoes with powerful airflow (5) catch them with strong glue sheet which do not contain harmful substances
- Air purification function: Emits plasmacluster ions, a proprietary technology that suppresses harmful substances and reduces static electricity, and quickly capture by the three-layer filter; pre-filter, deodorizing filter, and electrostatic HEPA filter with an unique air circultation flow.

▲From left to right: Air cleaning capacity 40/30/23 m 2 3 types

▲5 steps of safe mosquito removal using mosquito habit and air cleaning function

Challenges for Further Development

There are still many areas where air purification and reduction of mosquitoes that carry infectious diseases are required, and we would like to further expand the number of countries where Sharp's AIoT (AI+IOT) technology can be used to deliver risk reduction to as many people as possible as quickly as possible.

Profile of Project Company

Founded in 1912, the company's main business is to manufacture and sell telecommunications equipment, electrical equipment, and electronic applied equipment in general, as well as electronic components such as Smart Life, 8K ecosystem, ICT, display devices, and electronic devices businesses. The company is contributing to SDGs by promoting ESG management, which is composed by 2 principles; "solving social problems through business and technological innovation" and "reducing debt to society and the environment through sustainable business activities".

41. Disaster Response &Crisis Management Platform by visualizing the crises using AI

Spectee Inc. https://www.spectee.co.jp/

Challenges Addressed | ③ Floods, heavy rain & typhoons, ④ Extreme temperature changes

Adaptation Challenge Weather disasters, which are becoming more severe due to climate change, can affect local government disaster response, damage ~~to~~ infrastructure, and disrupt supply chains, which can harm residents and destabilize corporate business activities.

Contribution Spectee provides a solution that enables real time crisis visualization by using AI to collect and analyze social media data, weather information, and other data. Users will be able to grasp the real-time situation in the affected areas and the occurrence of disasters at each site in the supply chain through visualized information, enabling them to quickly develop measures to avoid or mitigate damage and ensure the safety of related personnel, thereby improving resilience.

Project Detail

Country | Philippines

■ Background

The Great East Japan Earthquake in 2011 has shown ~~signs of~~ potential ~~for~~ to utilize~~ing~~ useful information transmitted through social media, which led to the conception of the business. Until now, the company has developed its business in Japan, but it is now working to expand overseas, starting ~~with~~ from the Philippines. The Philippines, like Japan, is a disaster-prone country. In addition, English is widely spoken, and social media is very common in the Philippines, making good environment to introduce "Spectee Pro," and the Philippine government plans to begin trials. In addition, Spectee is aiming to introduce the system to the private sector, as there is a high demand for crisis management solutions due to the strong presence of Japanese companies ~~in the country~~ and numerous nodes of the supply chain~~.~~

■ Challenges and Responses in Business Expansion

Political systems and public procurement differ from country to country, so that the hurdles to approach government authorities in charge of disaster response are high. Spectee is trying to develop the business utilizing JICA projects to clear such hurdles.

■ Business Model of the Project

The company has developed "Spectee Pro," a data analysis platform for crisis visualization, offered to governments, private companies, and news media in Japan based on monthly subscription. It is used by local governments to issue evacuation order and rescue citizens based on each situation and condition, by private companies for business continuity and employee safety management, supply chain risk management, and by news agencies for disaster reporting, respectively. Currently, through the project with JICA, a feasibility study on the localization of the platform and business development is underway.

▲ User interface of Spectee Pro (PC and smartphone apps)

Related SDGs

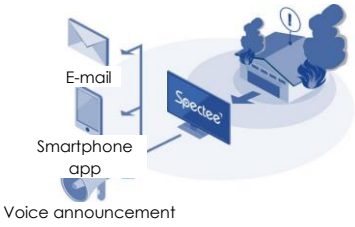
■ Key Success Factors

It is highly appreciated to be able to visually understand and analyze crisis events instantly using a wide range of information sources, including weather data and fact-checked information from social media.

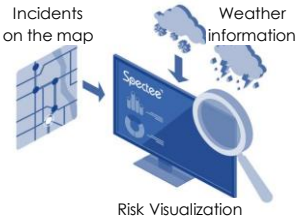
Product & Technology

Data analysis platform "Spectee Pro": A platform that visualizes crisis incidents related to a target area on a map, filtered by category (such as weather disasters, fires, and accidents) as well as by region. The AI instantly analyzes social media data from around the world and identifies location based on objects and text found in the posted images (patented technology). The platform uses AI analysis and human fact-checking to eliminate misinformation/disinformation and ensure accuracy before distributing information to users. Users can either directly search for information on the platform, or register their location of interest in advance and set up notifications (via e-mail or smartphone app notifications) to be sent when a crisis incident occurs within a specified range from the location.h4

▲ Instant collection of crisis information



▲ Real-time notification



▲ Visualization of damage and risks

▲ Information distribution flow

Challenges for Further Development

While utilizing support from its partners, the company aims to expand its business with a focus on ASEAN. Future challenges include improving the accuracy of data analysis through the higher availability of 5G and more frequent acquisition of satellite data, as well as realizing future predictions through simulations.

Profile of Project Company

Established in November 2011, Spectee aims to improve the resilience of society and realize a sustainable world through crisis visualization. The company released a test version of Spectee in May 2014, and officially released a significantly updated version, Spectee Pro, in March 2020. In addition, in November 2023, the company launched "Spectee SCR (Supply Chain Resilience)", a supply chain risk management platform for the manufacturing industry. The company received the TechCrunch Tokyo "Sakura Internet Award" in 2016, the Ministry of Internal Affairs and Communications' "INNO-vation Program" sponsor's special award in 2018, and the Japan Newspaper Publishers and Editors Association's "Encouragement Award for Technology Development" in 2019.

Inquiry regarding this matter
Contact person: Spectee Inc., Sales department
Phone: +81-3-6261-3655

42. The world's lightest & most compact X-band weather radar enables real-time monitoring of local extreme weather

FURUNO ELECTRIC Co.,Ltd. https://www.furuno.com

Challenges Addressed | ③ Floods, heavy rain & typhoons

Adaptation Challenge Due to the impact of climate change, localized weather disasters are becoming more frequent and extreme in many parts of the world. Intense urban precipitation, river flooding, and landslides are causing greater harm to humans, infrastructure and industry, as well as negatively impacting the economy.

Contribution Furuno's compact X-band weather radar can quickly and precisely detect local weather changes that have been difficult to observe with conventional large radar systems, contributing to reducing the damage caused by localized heavy rainfall disasters. In addition, the low-cost and lower-power consumption design of the radar will enable use in developing countries and municipalities that have had difficulty in introducing weather radars.

Project Detail

Country | Vietnam, Indonesia, Singapore, etc.

■ Background

Since Furuno successfully commercialized the world's first practical fish finder in 1948, it has maintained the leading global market share in marine radar technology. In 2008, sudden and localized torrential rain caused the Tsuga River in Kobe to rise sharply, resulting in a water-related accident. To prepare for such disasters, Furuno started R&D of a compact radar in 2009. Since its launch in 2013, the company has operated more than 120 units in Japan and abroad by 2023.

▲Localized heavy rainfall

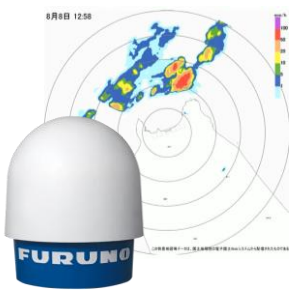
▲Urban flooding

■ Business Model of the Project

Sudden floods and landslides caused by short-term localized heavy rains are a frequent occurrence in developing countries located in the tropics. Furuno will promote the introduction of compact X-band radars and provide weather observation and disaster prevention monitoring solutions to governments and municipalities in developing countries that have had difficulties in introducing conventional large radars due to the costs. It will create new markets and applications by enabling simple, low-cost installation and operation. By achieving simple and low-cost installation and operation, the system can be closed only by local sales subsidiaries and distributors, creating new markets and applications.

■ Challenges and Responses in Business Expansion

Although the price is lower than other companies' products, it often takes time to secure budgets, especially in developing countries. We follow up with the local communities as appropriate to ensure that progress is made even if it takes time.



▲Meteorological monitoring system

Related SDGs

■ Key Success Factors

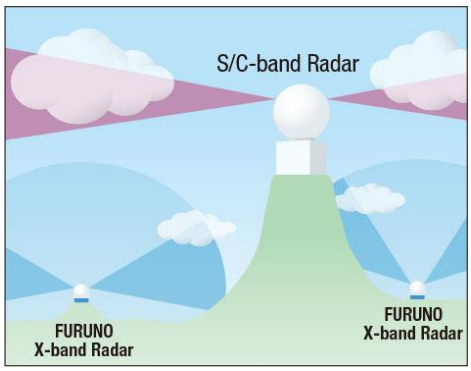
Furuno's compact X-band weather radar is advantageous over other products due to its small size, light weight, and a design that allows for easy installation and maintenance. In addition, the company is promoting sales utilizing the sales network it has already established mainly for marine electronics.

Product & Technology

Furuno's compact X-band weather radar is the world's smallest and lightest weather radars at about 1 m in diameter and 68 kg. Not only does it save space and allow for installation by hand in existing buildings, but it also significantly reduces installation costs and construction time. Unlike conventional C-band weather radar, which provides wide-area observations, this radar enables high-precision rainfall observations within a narrow observation area of 70 km radius. It can be installed in urban and mountainous areas and enables responses to local disasters such as torrential rains. In addition, the low-cost, low-power consumption design will allow it to be introduced to governments, municipalities, research institutes, and private companies in developing countries.

▲Installation by hand

▲Installation example (Vietnam)



▲Comparison with large radar

Challenges for Further Development

The product has a potential market in developing countries due to its low-cost and low-power consumption design and ability to be operated using household power sources.
The project will also contribute to strengthening local disaster preparedness by promoting its dissemination to universities and research institutions in countries and cities where flood response is a challenge.
Although the cost is lower than conventional products, governments of developing countries and local governments have limited financial resources.

Profile of Project Company

Since being the first in the world to commercialize a fish finder in 1948, Furuno has provided many world-first and Japan-first products in the field of marine electronics based on its unique ultrasonic and electronic technologies. With sales offices in more than 80 countries around the world, the company has built a solid position and brand as a comprehensive manufacturer of marine electronics equipment on a global scale. Furuno integrates the knowledge, experience, skills, and know-how cultivated in its business with the three core technologies of sensing, signal processing, and information and communication technologies to provide solutions not only for the marine industry, but also for various industrial sectors.
Furuno's Meteorological Observation System won the Best Resilience Award in the corporate and industrial category at the 2017 Japan Resilience Awards, which is sponsored by the Resilience Japan Promotion Council.

43. Development of an early warning system with high weather prediction accuracy

Weathernews, Inc. https://jp.weathernews.com/

Challenges Addressed | ③ Floods, heavy rain & typhoons, ⑨ Ecosystem loss

Adaptation Challenge The worsening and increasing frequency of extreme weather events have been causing floods and landslides in various regions, leading countries to be engaged in response efforts.

Contribution Weathernews, Inc. predicts and alerts users to localized weather phenomena, reducing damages through accurate forecasts and detailed reports. They promote vigilance and preparedness, mitigating the impact of weather events.

Project Detail

Country | Thailand

■ Background

In Asia, disaster countermeasures utilizing weather information are not sufficiently taken, and in Thailand, flooding and landslide disasters due to typhoons, short periods of heavy rain and thunderstorms occur during the rainy season from June to October every year. Weathernews, Inc., which achieved the No. 1 forecast accuracy in Japan in a survey conducted in 2023, began providing the Thai National Railways with "Go or NG Decision Support," a service for railway operators, in 2021 based on the accumulated results. With the provision of this service, Thailand, which has been difficult to operate in pursuit of safety and stability in the past, is considering the use of this service to judge the timing of planned suspension of service, evacuation of vehicles, and resumption of service taking into consideration the weather risk.

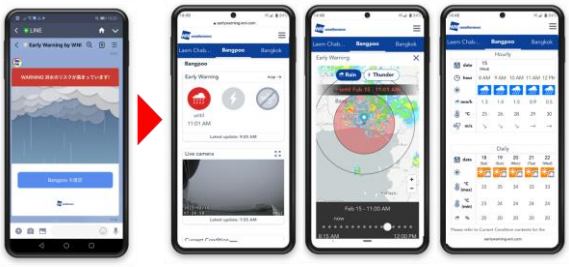
In 2023, it released the Weathernews Early Warning system for factories in Thailand. Based on its own forecast, it notifies users via LINE or email when the possibility of heavy rain, strong winds, or lightning strikes increases in a user-specified area. In addition, the dedicated website allows users to check hourly pinpoint forecasts and contribute to flood and lightning protection and employee safety.

■ Challenges and Responses in Business Expansion

Each country has its own rules for the dissemination of weather information, and it is necessary to develop services in accordance with these rules. In cooperation with the Bangkok Metropolitan Government, Weathernews, Inc. provide accurate weather information in Thailand using Weathernews, Inc.' meteorological technology and observation data owned by the Bangkok Metropolitan Government. It will be used by both sides as a disaster prevention measure, such as measures against inland water flooding, and has launched efforts to reduce the risk of natural disasters and strengthen resilience in Bangkok.

■ Key Success Factors

The company has many track records of railway services, mainly in Japan, and it has a high reputation for supporting the development of rules in Thailand, where no railway operation rules have been established.



▲Notify Weathernews Early Warning users on the LINE talk screen when there is a risk of rain, wind, or lightning

Related SDGs

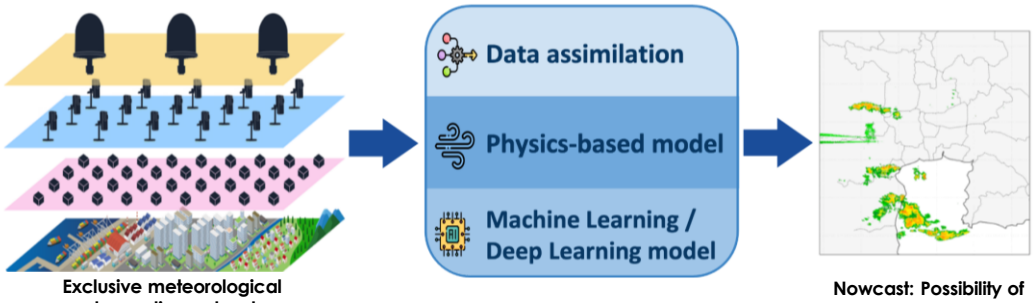
■ Business Model of the Project

Weathernews Early Warning is being marketed to Japanese companies, which are highly aware of disaster prevention, to promote its adoption by local companies.

Product & Technology

Weathernews Early Warning: This early warning system notifies factories of risks such as rain, lightning, and wind through LINE or email alerts. It can be utilized for flood and lightning countermeasures, enhancing climate change resilience in facilities, and ensuring employee safety. Weathernews, Inc. is also pioneering the use of nowcasting in Thailand, providing support through highly accurate predictions.

Go or NG Decision Support: This service provides rainfall data from observation devices installed along railway lines, along with weather forecasts, to support decision-making regarding operational suspensions, vehicle evacuations, and resumption timing, considering weather risks. It has been adopted by approximately 80% of major railway operators in Japan. By analyzing and operating rainfall observation data for each railway line, Weathernews, Inc. considers the optimal operational criteria.



▲WeatherNews, Inc.'s own forecast flow in Asia

Challenges for Further Development

Weathernews Early Warning currently has predominantly Japanese companies as its major clients, indicating a difference in disaster preparedness awareness between Japan and Thailand. To further expand its services, there is a need for a shift in mindset towards utilizing information for disaster preparedness.

Creating forecasts of the same quality as in Japan requires collaboration with various organizations and the expansion of observation networks, as the local observational data is currently insufficient.

Profile of Project Company

Founded in 1986 with the mission of "protecting the lives of sailors" following a maritime accident in 1970, the company now operates in various sectors, including marine weather, aviation weather, terrestrial weather, mobile and internet weather, broadcast weather, environmental weather, sports weather, and climate change. In 2022, they entered into a collaborative agreement with the Ministry of the Environment called the "Cooperation Agreement for Promoting Climate Change Adaptation." This agreement aims to increase awareness of climate change adaptation initiatives and engage in continuous discussions to promote climate change adaptation, including measures to address heatstroke.

Inquiry regarding this matter
Contact: https://jp.weathernews.com/contact/inquiries-about-our-services-biz/

44. Contribution to early warning through highly accurate and durable water level gauges

TOKYO KEIKI Inc. https://www.tokyokeiki.jp/e/products/measurement/

Challenges addressed | ③Floods, heavy rain & typhoons

Adaptation Challenge Increasingly powerful typhoons and frequent guerrilla downpours are causing floods and landslides in many parts of the world, making it necessary to enhance early warning systems to mitigate damage.

Contribution Toky KEIKI's Radar Level Gauges have more than half of the market share in Japan as sensors for 3L Water Level Gauges. The company is also expanding the use of its Radar Level Gauges for similar applications to developing countries, particularly Vietnam, and is contributing to the reduction of flood risks through early warning.

Project Detail

■ Background

Country | Vietnam, etc.

TOKYO KEIKI, Japan's first instrument manufacturer, has a number of measurement achievements, including crisis management water level gauges as a response to the increasingly severe water disasters in Japan. TOKYO KEIKI has also applied this knowledge to provide Radar Level Gauges to Vietnam and other overseas countries in order to solve the same problems.

A pressure type level meter that has a risk of malfunction or physical damage due to sedimentation because the sensor is installed underwater. Apart from such pressure type sensors, in principle, Non-contacting Radar Level Gauges are virtually unaffected by temperature and humidity, and can be used maintenance-free.

Taking advantage of these features, TOKYO KEIKI's Radar Level Gauges are as good as its European competitors because of its high accuracy and durability, while achieving reasonable prices.

In addition to rivers, the need for countermeasures against overflows from sewage systems is increasing due to the frequency of guerrilla torrential rains. Taking advantage of the many sales results it has accumulated in the field of river water level gauges, TOKYO KEIKI has now begun to expand its business into Vietnam.

■ Challenges and Responses in Business Expansion

When TOKYO KEIKI first started business in Vietnam, they had a hard time finding local partners, so they consulted with JETRO and other organizations that suggested potential partners. Furthermore, by hiring Vietnamese nationals, the company was able to establish a system that would make it easier for local companies to accept them.

■ Key Success Factors

Since few companies in Japan are capable of manufacturing radar level gauges, TOKYO KEIKI has built up a track record of sales in Japan. Although ultrasonic level gauges are available in market, radar level gauges are more reliable in principle. Because Ultrasonic can be affected by temperature or humidities. In addition to their domestic track record, Radar Level Gauges have been introduced worldwide for their high accuracy, robustness, and maintenance-free features.

▲Example of Non-Contacting Radar Level Gauges Delivery to a River

Related SDGs

■ Business Model of the Project

River level gauges are used by various vendors that deal with early warning systems. The level meters for sewer overflow countermeasures are being marketed to public bodies in cooperation with a Japanese company that also handles early warning systems.

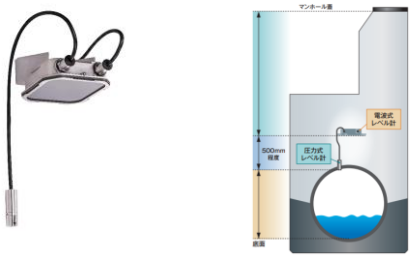
Product & Technology

Non-contacting Radar Level Gauge: Non-contacting radar level gauge that measures river water levels using radar technology. The measured water level is then used in an early warning system to help issue evacuation advisories to nearby residents.

The pressure type, in which the sensor is submerged in the river bottom and water level is measured by water pressure, is a contact type and may be damaged, accumulated, or lost due to driftwood or sediment when the water level rises. On the other hand, Non-contacting Radar Level Gauge is virtually unaffected by temperature and humidity, and stable measurements with a high accuracy of ±2 mm are possible.

"HC -10" Hybrid Level Gauge for flood prevention: A level gauge that measures the water level in a sewerage system by combining a radar type and a pressure type. Basically installed inside of man-hole. Hence with only the radar type, there is a risk of measurement failure if the level gauge is submerged under water due to high water levels, such as during a guerrilla downpour.

The pressure type only has the aforementioned risk. By using a hybrid system, in which the water level is measured by the radar method during normal water levels and the water level is measured by the pressure method when the water level rises to a high level that cannot be measured by the radar method, it is possible to complement each risk. This hybrid level gauge maximizes the advantages of each method, such as the ability to utilize mutual data and maintain a high level of accuracy.



▲Product and installation image of HC-10 level meter for flood prevention

Challenges for Further Development

TOKYO KEIKI will promote sales of level gauges for overflow countermeasures from Vietnam, where it has a representative office and many dealers and partners. In sales, the company is conducting sales activities in cooperation with companies that handle early warning systems, and aims to increase the number of installations by utilizing the connections it has established through sales of water level gauges for rivers. In developing countries, it is expected that sewage systems will be developed to secure water resources due to population growth and to maintain the environment. However, at present, awareness of the need for early warning systems for sewage systems is low, and the challenge is to educate people about the need for measures for sewage systems in order to increase the number of installations.

Profile of Project Company

Established in 1896 as the first instrument manufacturer in Japan to promote domestic production as a pioneer in navigation instruments. Since then, TOKYO KEIKI has developed into a comprehensive manufacturer of precision instruments. Currently, the company holds the top share in a diverse range of niche markets in Japan, including marine, aviation, railroad, disaster prevention, agriculture, and energy, and contributes to the challenges of social solutions. Going forward, the company will promote further business expansion by strengthening its existing projects and growth drivers such as AI, hydrogen, space, and railroads, while creating unique, high-value-added products to solve social challenges set forth in the SDGs.

Inquiry regarding this matter
Contact person: TOKYO KEIKI Inc., Measurement Systems Company, Overseas Sales Sect., Sales Dept., Shuntaro Sakai
Phone: +81-3-3737-8664
E-mail address: overseas-sales03@Tokyo-keiki.co.jp

45. Reduction of lightning damage by installing lightning arresters

Otowa Electric Industry Co., Ltd. https://www.otowadenki.co.jp/

Challenges addressed ③Floods, heavy rain & typhoons

Adaptation Challenge Research indicates that the number of lightning strikes may increase by about 50% by the end of this century due to global warming, and strengthening countermeasures is an issue, especially in regions with high lightning damage, such as Africa.

Contribution As a company specializing in lightning countermeasures, Otowa Electric Industry will contribute to the reduction of lightning damage by installing lightning arresters and consulting.

Project Detail

Country | Rwanda

■ Background

Lightning occurs 200 days a year in Rwanda, and while 2-3 people a year are affected by lightning in Japan, about 100 people a year are affected in Rwanda. Otowa Electric Industries visited the area and began considering business opportunities after receiving a request from a Rwandan intern accepted under JICA's ABE Initiative (Industrial Human Resource Development for Africa's Youth Initiative) in 2015 to improve lightning damage countermeasures in Rwanda.

In 2017, the project was adopted as a project development survey by JICA, which trained local engineers, conducted interviews with local residents, invited local engineers to Japan, and conducted field surveys. In 2019, it was adopted as an extension demonstration project and local engineers were invited to Japan. After conducting training in Japan, trained engineers have been working to reduce lightning damage by training human resources and continuing to raise awareness of Otowa Electric's technology.

■ Challenges and Responses in Business Expansion

In developing countries, there is a strong tendency to rely on subsidies and ODA, and the first step to success is for the local community to raise even a portion of the costs. The company has recently implemented measures for new buildings at local expense, and plans to develop full-fledged business as the difference in lightning protection becomes more pronounced in the future.

■ Key Success Factors

Interns from Rwanda serve as contact points after returning to the country and provide support to local engineers, thereby enabling smooth business development.

In addition, it has been praised for its accurate consulting based on its record of leading market share in Japan.

▲On-site meeting with local engineers

Related SDGs

■ Business Model of the Project

Otowa Electric Industry Co., Ltd is considering business by inviting engineers to Japan and transferring technology for lightning damage prevention. In addition, since the necessary materials for manufacturing lightning rods can be imported from countries surrounding Rwanda, the company is considering the creation of a local industry in the future by establishing a system to manufacture and sell the products locally.

Product & Technology

SAFE HOUSE (human damage prevention): This system combines lightning sensors and buildings with lightning protection technology. In rural Rwanda, residents are being harmed by lightning flowing through rainwater that has entered the building. By effectively placing grounding wires around the building and allowing lightning to escape deep into the ground, damage inside the house can be prevented. In addition, the installation of lightning sensors detects thunderclouds within a 30 km radius and emits sirens within a 20 km radius. The sirens will alert residents so that they can evacuate to the SAFE HOUSE.

Lightning Arrestors (Physical Damage Countermeasures): A device that protect electronic equipment and appliances in buildings from damage caused by lightning overvoltages.Rwanda has installed SPD for power supply and SPD for communication.

Educational activities: Since the lack of sufficient knowledge of lightning has contributed to the spread of damage, workshops are held to learn about lightning, and educational activities are conducted on the correct response to lightning occurrences.

▲Typical SPD of anti-lightning products)

▲(Sensor Signaling the Approach of Lightning)

Challenges for Further Development

Otowa Electric Industry has received inquiries from countries other than Rwanda, so the company is considering expanding the business to countries surrounding Rwanda in the future. Although a lack of resources will be an issue when expanding into other countries, Otowa Electric Industry will utilize the engineers we have trained in Rwanda to expand our business into other African countries.

Profile of Project Company

Founded in 1946. In 2017, the company was selected by the Ministry of Economy, Trade, and Industry (METI) as a "Company Driving the Future of the Region" and in 2019, it was appointed as a "Special Envoy for TICAD Public-Private Partnership Promotion" by the Ministry of Foreign Affairs of Japan. In addition, the company has received numerous awards, including the Grand Prix in the Knowledge Capital Category of the 6th Knowledge Innovation Awards for its activities to protect African children from lightning.

Inquiry regarding this matter
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46. Preventing Peat Fires by Measuring Field Data on Peat Lands

Midori Engineering Laboratories, Inc. https://midori-eng.com/

Challenges addressed | ②Droughts, ⑦Air, water & land-based pollution

Adaptation Challenge Extreme weather conditions are causing the water level in peatlands to drop severely during the dry season. The lowering of the water table makes peat fires more likely to occur, and the toxic substances generated by the fires are dispersed to neighboring countries, causing health hazards.

Contribution The Green Engineering Research Institute contributes to the prevention of peat fires by visualizing field data such as water levels, rainfall, and soil moisture in peatlands.

Project Detail

Country | Indonesia, etc.

■ Background

In Indonesia, floods during the rainy season by increased rainfall, and drought during the dry season is becoming more severe, due to climate change. In particular, toxic substances generated by peat fires which are becoming more serious due to drought, are dispersed to neighboring countries by the easterly winds, causing health hazards. These peat fires also emit enormous amount of CO2. To prevent them, tt is required by government ordinance to maintain the groundwater level within 40 cm below the surface. However, the lack of monitoring is hindering activities to prevent peat fires. From 2013 to 2017, Midori Engineering Laboratories, which sells the "SESAME Series" that can measure field data, has installed a system to monitor groundwater levels, utilizing JICA's research and PoC program.

In addition to monitoring groundwater levels, the "SESAME series" can also visualize river water levels, rainfall, and weather data, and is being used as an agricultural water management system in Vietnam, and flood warning system in Malaysia.

■ Challenges and Responses in Business Expansion

Overseas, maintenance budgets are not secured, and equipment problems occur several years after installation, which is an issue. We contribute to solving local problems by providing ongoing support rather than selling out, for example, by selling to companies that have secured maintenance budgets and established a system that enables continuous operation.

■ Key Success Factors

The type of sensor connected can be changed, allowing a single unit to acquire necessary data such as water level, rainfall, weather observation, and water quality, according to the user's needs. After the equipment is installed, the local distributor will contract with the user for management of data communication, servers, and other services, and checks the site annually to support ongoing operations. It is important to establish a reliable local disctributor.

▲Demonstrated equipment handling training for counterparts

Related SDGs

■ Business Model of the Project

In its Indonesian operations, the company has a local distributor, through which it sells, manages installation, and provides after-sales service for the SESAME series. The company also provides support from Japan, if necessary, as remote monitoring is available.

Product & Technology

Field data real-time observation system "SESAME (Sensory Data Transmission Service Assisted by Midori Engineering) series: The system measures water levels, rainfall, soil moisture, meteorological data, water quality data, etc., and transmits the data to a cloud server using cellular phone communication networks or satellite networks. It allows users to check and analyze data real time, using a smartphone or PC. This system is compatible with a variety of general-purpose sensors, so any kind of sensor can be connected to collect desired field data based on customer's needs. Additionally, the power-saving design ensures stable data collection and transmission even in outdoor. The management screen allows users to comprehensively check and manage measured water levels, photos and other data, and at the same time, also check necessary data individually. In addition to being used for monitoring field data in dams, rivers, rice paddies, and peatlands, the system has also been adopted by academic institutions for research on climate change adaptation measures.

▲ Equipment installed at Jatiluwur Dam in 2013

▲SESAME Image (Hokkaido x IoT x World)

Challenges for Further Development

Continuous demand for the "SESAME series" is expected, due to the Indonesia's legal requirement to manage water levels in peatlands. In addition, the system is currently being used in agriculture to measure field data such as soil moisture, temperature, and humidity, which can contribute to the improvement of productivity. To enter the agricultural field, the company will start by providing the system to agricultural corporations and continue demonstrating results through PoC, and eventually introduce the system to individual farmers as well.

Profile of Project Company

Established in 2004 as an agricultural civil engineering consulting firm engaging in designing water management systems. Its main business is to design, manufacture, and sell the field data transmission system; SESAME system, and early warning systems. In 2018, the company was selected as one of the "300 Small and Medium Enterprises" by the Small and Medium Enterprise Agency.

Inquiry regarding this matter
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47. Advanced disaster countermeasures through a platform that integrates data necessary for disaster countermeasures

INSPIRATION PLUS Inc. https://inspiration-plus.com/

Challenges addressed | ③Floods, heavy rain & typhoons

Adaptation Challenge The damage caused by weather disasters such as severe and frequent torrential rains is becoming more and more serious, and local governments are faced with the challenge of providing appropriate evacuation instructions, disaster information, and disaster risk management.

Contribution INSPIRATION PLUS contributes to the advancement of disaster countermeasures through an information utilization platform built by industry-academia-government-private sector collaboration.

Project Detail

Country | Indonesia

■ Background

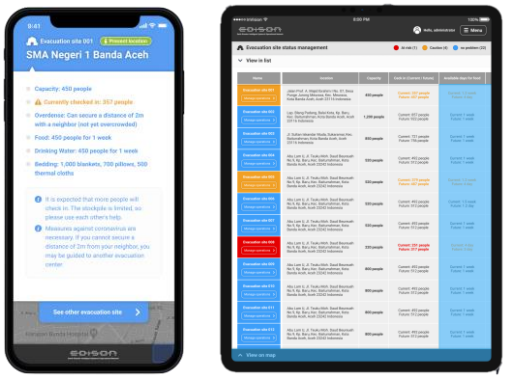
Business in Indonesia started from the Design Thinking event held by SAP and UNDP, where we have held discussion on business that can be driven by human centric approach to technology. The city of Banda Aceh in Indonesia was studying how to ensure the safety of its residents in the event of a disaster. More specifically, there urgent issue was to utilize mobile devices to notify disaster information. With the help of SAP, INSIPIRATION PLUS has supported development of an application which issues alerts and route instructions to evacuation centers on mobile, and at the same time, enables Banda Aceh city to manage the number of evacuees and stockpiles of goods on the platform. This application is developed around "PREIN"; a data utilization platform built by industry, academia and government to achieve advancement of disaster countermeasures.

■ Challenges and Responses in Business Expansion

In order to utilize PREIN, providing information to residents via mobile phones are essential. However, in Banda Aceh, the usage rate of mobile phones itself is low due to weak network. Banda Aceh city is working to improve the effectiveness of PREIN by distributing mobile phones.

■ Key Success Factors

Integrating data necessary for disaster management and utilizing the information as intelligence to distribute early warning notifications and encourage immidiate evacuation. It also enables advanced disaster countermeasures through distributing information to mobile phones, check-in functionalities at evacuation centers, and notification functions.



▲Mobile Evacuation Instructions and Evacuation Center Management

Related SDGs

■ Business Model of the Project

As a platform for early decision-making and rapid initial response, the system is used by local governments to issue evacuation orders and confirm damage conditions. It is also used by private companies to manage their own manufacturing sites and supply chain risk management.

Product & Technology

Disaster Data Utilization Platform "PREIN": A data utilization platform build by industry, academia and government to achieve advancement of disaster countermeasures. "PREIN" will integrate data necessary for disaster countermeasure design and visualize analysis results, to address the issue that these data are not centrally managed because each governments, municipalities, private companies, etc. are managing disaster countermeasures on their own. The main features are as follows

- Platform which integrates various reusable data: Integrates static data such as population and dynamic data such as weather and water levels, and video and images acquired from satellites, drones, etc.
- Real-time utilization and visualization of data: Subdivides risks into 500m mesh and, visualize them. Also, assess risks up to 15 hours ahead.
- Multifaceted data analysis, forecasting, and simulation: Provides immediate initial response in the event of a disaster, as well as advance planning and training for general disaster prevention plan.
- Integrates with data resgistration and reporting systems as the information platform: Supplement the risk assessment functions etc. by integrating with disaster response systems

▲PREIN Doron Information Sharing, Real-time Risk Management, Dashboard)

Challenges for Further Development

Utilizing the results in Japan and the efforts in Indonesia, we aim to expand the introduction of the system in local governments and private companies and establish a mutual aid system. In some overseas countries, the basic data necessary for disaster countermeasures has not yet been developed, and this is an issue to be considered in the future.

Profile of Project Company

Established in 2022, as a result of an agreement reached between Oita University, Zynas Corporation, and SAP Japan in 2018 to work on a platform for disaster prevention and mitigation (EDiSON). In 2021, "PREIN" was launched for public sales, based on EDiSON, which the three parties worked on research and development. The company aims to resolve social problems and support the growth of society by insipirations based on experience and expert knowledge, and the implementation of cutting-edge technologies.

Inquiry regarding this matter
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48. Contributing to the reduction of non-revenue water and stable supply of safe water by detecting leaks from buried water pipes

Suidou Technical Service Co., Ltd http://www.suidou-tec.co.jp/

Challenges Addressed | ⑤ Water insecurity

Adaptation Challenge In the case of water supply facilities that are supplied by timed water supply or low water pressure, cracks and holes that occur in water pipes cause the intake of external substances and lead to contamination of tap water. In addition, inadequate public health due to the shortage of water supply, which became prominent during the COVID-19 crisis, is a major hindrance to the prevention of infectious diseases. Moreover, there are still many health hazards caused by water shortage.

Contribution Water leakage detection technology and products from Suido Technical Service (STS) make it possible to investigate and identify leakage from buried water pipes, one of the main causes of non-revenue water (NRW). Improving the NRW rate contributes to adapting to the reduction and deterioration of water resources due to climate change, and also benefits public health. Prevention of precious water contributes to the stabilization of the management of water utilities and the supply of safe water to users.

Project Detail

Country | India, Vietnam

■ Background

India: By utilizing the JICA Project Formulation and Dissemination/Demonstration scheme between 2013 and 2017, it has contributed to reduction of water leakage rate, improvement of water supply service, soundness of water supply business for Bangalore Water Supply and Sewerage Board as counterpart organization. After the end of the project, a NRW countermeasure department was set up within the department. Subsequently, in 2017, with the support of the JETRO Specialized Program and JETRO Bangalore Office, STS received a direct contract from the Karnataka State Government to conduct training on water leakage surveys for the staff of the Waterworks Bureau. Currently, STS aims to expand its business in India in partnership with a local infrastructure company.

Vietnam: From 2013 to 2016, through a public-private partnership between JICA and Yokohama City Waterworks Bureau, STS participated in the "Safe Water Supply Project in Vietnam with Private Technology in Yokohama" and implemented a project for Hue Water Corporation in Vietnam. The corporation highly valued STS's leak detection technology and concluded an MOU with STS. STS is currently providing training on water leakage surveys to other water utilities in Vietnam in cooperation with Hue Water Supply Corporation, to improve the operation of water utilities by reducing non-revenue water, and to ensure safety and security in provision of water in Vietnam.

■ Challenges and Responses in Business Expansion

The sales focuses on technology rather than products, making remote sales challenging. Therefore, while considering methods for remote sales, explanations and guidance are currently being provided by visiting the sites in person.

■ Key Success Factors

Utilizing subsidy schemes of government agencies and local governments such as JICA, JETRO, IDEC, and the Yokohama City Waterworks Bureau, they implemented projects internationally and built trusting relationships with government agencies of partner countries.

Related SDGs

■ Business Model of the Project

The following three businesses related to water leakage investigation are core overseas businesses; (1) Provision of on-site water leakage investigation service by STS investigators, (2) Conducting training for measure on non-revenue water for water utilities, and (3) Sales of leak detection monitoring equipment and plastic meters. (2) For non-revenue water control training, in consideration of cost and sustainability, the business model was changed from one in which engineers are dispatched from Japan to one in which local engineers are trained to provide guidance on a system that enables continuous orders to be received.

Product & Technology

- Provision of leakage investigation services using various investigation equipment.
- Provision of human resource development training for non-revenue water reduction for the purpose of technology transfer of leakage detection.
- Provision of water leakage monitoring equipment and plastic meters.

Currently, the company is switching to IoT-enabled products, aiming to build a system that will enable remote pipe management through IoT, whereas previously it was necessary to check for leaks on site.

In developing countries, the focus is on technology transfer of intangible assets, such as knowledge, sound hearing technology, know-how, and processes for detecting leaks locally, rather than providing equipment. If local staff can acquire STS's survey technology, NRW due to water leakage can be reduced. NRW reduction is equivalent to additional water resources development, which not only makes efficient use of water resources but also minimizes environmental impact. Energy efficiency in water intake, water treatment and water transfer can be improved, which can contribute to mitigating climate change.

▲Water leakage monitoring equipment L-sign / L-chaser

▲Water leakage survey training

▲Identified water leakage point

Challenges for Further Development

The approach is to work with local private companies to form ongoing projects for water utilities, leveraging the relationships of trust established with government agencies in the partner country. Since a large number of projects will be tendered, the company will promote the acquisition of new public works projects by uncovering new projects.

Profile of Project Company

Suido Technical Service Co., Ltd. was established in 2002 as a specialized company for water leakage investigation. Its goal is to create a sustainable society where everyone can receive the benefits of water with peace of mind by contributing to the sustainable supply of safe and secure water through our business activities. Its mission is to provide a stable supply of safe water through prevention from water leakage.
In 2018, STS was selected by the Ministry of Economy, Trade and Industry's Small and Medium Enterprise Agency as "300 small and medium-sized enterprises and small businesses in 2018."

Inquiry regarding this matter
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49. Curbing flood damage and solving water shortage with rainwater storage system

SEKISUI CHEMICAL Co., Ltd. https://www.sekisui.co.jp/

Challenges Addressed | ② Droughts, ③ Floods, heavy rain & typhoons, ⑤ Water insecurity

Adaptation Challenge Water shortage brought upon by drought due to climate change results in damage in agricultural production. At the same time, increase of extreme weather events leads to growth in flood damage.

Contribution Sekisui Chemical's "Crosswave" rainwater harvesting system helps prevent flooding during heavy rains by storing rainwater in underground reservoirs. The system also stores rainwater and is used as a rainwater utilization tank.

Project Detail

■ Background

Country | India

Against a background such as India's chronic water shortage, where the installation of rainwater harvesting facilities is mandatory for factory construction, the company began overseas sales in 2010, and as of 2023 has sold more than 13,000 systems in Japan and abroad. While most of the reservoirs are generally built on factory grounds, the Cross Wave, which can be installed underground in parking lots and other locations, matches the needs of many clients. Overseas, the company has experience in Taiwan and Indonesia, where flood damage caused by typhoons and torrential rains is serious and is expanding into ASEAN.

■ Challenges and Responses in Business Expansion

Since the accuracy of design and construction and awareness of safety management differ from country to country, we have established a system that enables local construction by providing support from Japan in advance, such as lectures using video clips.

■ Key Success Factors

In India, the adoption has been achieved by working closely with the local government from the criteria-making stage by leveraging the connections of joint ventures and partner companies. The Company strives to build close relationship with local governments through collaboration with consulting firm familiar with local affairs.Another reason for the Product to be readily accepted by countries is its resilience and simplicity for construction work and maintenance that originate from the product properties.

▲Installation of CROSS-WAVE

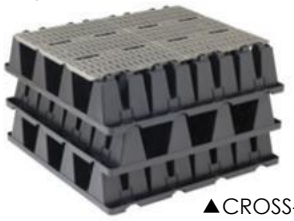
Related SDGs

■ Business Model of the Project

In each country, local subsidiaries of the Sekisui Chemical Group, in cooperation with local consulting firms, promote the business through publicity to governments, municipalities, and related organizations, and sell the products through distributors. In India, the products are manufactured locally, and in other countries, they are exported from Japan.

Product & Technology

CROSS-WAVE: Rainwater storage systems that enable recycling of rainwater by controlling the influx of rainwater to the sewage pipes and rivers at heavy rain, used as plastic materials to store rainwater in underground storage tanks for recycling or control of outflow. The systems have following advantages as compared to the concrete storage tanks.


▲CROSS-WAVE

- Short construction period and affordable cost.
- Recycled plastic materials that contribute to low emission of carbon dioxide in the product lifecycle.
- Load capacity design that enables the use of land above for parking space, etc. while preventing land subsidence.
- High porosity that creates underground space to retain water for the outflow control and effective use of rainwater, as well as slow release of rainwater upon temporary storage after torrential rain to prevent overflow. Rainwater in the storage can be used to water fields and flush toilets.

Challenges for Further Development

Towards further achievements, the next challenges are to streamline the standards to expand local production and to ensure the introduction of high-quality products as well as the methods for performance evaluation. While it is possible to utilize the bases and factories in each country in establishing a cost-effective local production system, further increase in demand is needed as awareness of the importance of rainwater harvesting in developing countries grows.

Profile of Project Company

SEKISUI CHEMICAL CO., LTD. is a leading resin manufacturer founded in 1947, with a growing array of products ranging from daily sundries such as cellophane tape and plastic pail to pipe materials that underpin both the public and private infrastructure, high-performance materials for electronics and transport equipment, medical products and the revolutionary unit-constructed housing called "Sekisui Heim". With prominent technology and quality, the Company heads the development as a frontier in the fields of "residential and social infrastructure creation" and "chemical solutions" under the Group Vision as part of its contribution to better lives of people and environment worldwide. The Company also advances environmental contribution as a center of business based on the SEKISUI Environmental Sustainability Vision. CROSS-WAVE is internally certified as "Products to Enhance Sustainability" which facilitates the adaptation to climate changes as well as to intensification of natural disasters. The company has been named one of the "100 Most Sustainable Corporations in the World" for six consecutive years since 2018 in the "Global 100 Index" in which the World Economic Forum (WEF) evaluates 8,080 companies.

50. Stable supply of water with high turbidity raw water compatible water purification equipment

Tohkemy Corporation http://www.tohkemy.co.jp/index.html

Challenges Addressed | ⑤ Water insecurity

Adaptation Challenge In developing countries where water supply facilities are not provided, rainwater, river (surface water), groundwater, etc., which are not treated for water purification, are used as domestic water, and are exposed to health hazards such as diarrhea and conjunctivitis. In addition, there is a concern that the increase in turbidity due to the increase in rainfall or the depletion of water resources due to the decrease in rainfall will become more severe due to the effects of climate change.

Contribution Tohkemy's high-turbidity raw water-compatible water purification system can purify ultra-highly turbid water stably and efficiently, providing a stable supply of domestic water and improving the health and sanitation of residents by improving water quality.

Project Detail

Country | Laos

■ Background

From 2015 to 2018, JICA promoted, demonstrated, and commercialized the project (support for small and medium-sized enterprises). Demonstration Project for Spreading and Demonstrating Water Purifiers for Raw Water. The purpose of this project was to provide a stable supply of safe water, correct regional differences in water supply services, and purify stable and inexpensive surface water, which becomes extremely turbid in rainy weather. Through this project, Tohkemy's high turbidity compatible water purification system (1000m3 / day: equivalent to about 6,600 people) has been installed and is operating as a tap water supply system in Paksan City. A JICA project feasibility study, also in Laos, from 2019 to 2022, confirmed that utilizing fiber filtration technology in existing water treatment plants is expected to reduce turbidity levels as well as reduce chemical usage fees.

■ Challenges and Responses in Business Expansion

The cost of water purification systems for high turbidity raw water is a bottleneck and a hurdle to their adoption in developing countries. By providing simple systems that meet local needs at low cost, such as those for small towns, the number of projects is increasing.

■ Key Success Factors

Established Lapon Company Limited in Laos in 2011 as a local partner company. It is possible to cooperate for the smooth implementation of projects in Laos.Demand for water treatment technology is increasing in areas where water services are not yet established. In particular, securing and stable supply of domestic water for residents is an urgent issue, and the need for high-turbidity raw water-compatible water purification equipment is increasing, especially in developing countries.

▲River water with high turbidity

▲Paksan district water purification system building

Related SDGs

■ Business Model of the Project

This is a public-private partnership with the Lao government, Lao government officials, JICA, and other stakeholders. The government will promote the standardization of reasonable equipment that meets local needs while utilizing public funding schemes such as JICA, and will consider business development in Laos and other developing countries in the future.

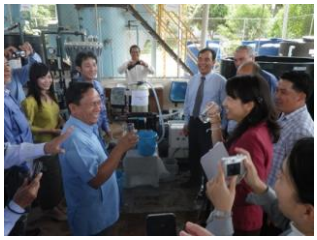
Product & Technology

Tohkemy's high-turbidity raw water-purifying water purification system consists of a fiber filtration system (Acti Fiber) and a sand filtration system. With this device, it is possible to purify river water with a turbidity of more than 1000 NTU, which is often found in areas with a rainy season, to a WHO standard of 5 NTU or less.
The features of the high turbidity raw water compatible water purifier are as follows.

- Fiber filtration technology for small and high turbidity (patented)
- Reduces desalination costs by 1/3 compared to coagulation sedimentation facilities because of the higher volume of water treated per hour
- Installation space is compact and on-site installation time is shortened
- Inexpensive versions available to reduce initial costs

▲High turbidity raw water compatible type water purification equipment

▲ Children delighted by purified water



▲Stakeholders drinking water purified by the device

Challenges for Further Development

In the future, we will not only utilize public funding schemes such as ODA, but also expand our sales channels in Laos and other developing countries as our own business. Tohkemy is also looking at local production and need to find partners outside of Laos.

Profile of Project Company

Tohkemy Co., Ltd. (Headquarters: Osaka City) is a manufacturer and distributor of water treatment materials and equipment, including filter materials for water treatment, chemical injection pumps, stirrers, control equipment, and small equipment. Since its establishment in August 1965, the company has manufactured and sold filtration media and water treatment unit products, as well as constructed and maintained water purification plants, etc. in Japan. In addition to Laos, South Korea, Taiwan, China, Indonesia, Thailand, Malaysia, India, Brazil, Russia, the Philippines, Vietnam, etc. have been delivered products (including delivery via plant manufacturers or trading companies).

51. Securing sustainable water resources through water-saving plants

JGC Holdings Corporation https://www.jgc.com/en/

Challenges Addressed | ⑤ Water insecurity

Adaptation Challenge In regions where it is expected to be less rainfall and longer dry seasons in future due to climate changes, it is becoming a challenge to cope with limited freshwater resources such as river water and groundwater. Moreover, in closed water areas with minimal ocean currents, over-dependence on seawater will lead to the increase in seawater temperature and salinity.

Contribution JGC is proposing the water-saving plants that reduce water intake and wastewater discharge with the optimum selection of water supply, wastewater, cooling water, and heat medium systems, considering the constraints of water sources and the water balance of the entire plant and facility.

Project Detail

Country | Iraq, Oman, Saudi Arabia, etc.

■ Background

JGC Group builds plants and facilities around the world in a wide range of industrial fields, including oil & gas, energy infrastructure such as power plants and steel & metal plants, industrial infrastructure, and social infrastructure such as hospitals and environmental facilities.

In areas where there are concerns about the restrictions on the usage or the risk of depletion of water resources in future, it is very important to save water consumption. The concept of a water-saving plant can not only mitigate the long-term impact on the surrounding water environment, but also contribute the achievement of customers' capital investment plans. Water treatment is an energy-consuming process in plants, and it is an important element in plant design to save energy consumed in the water treatment.

■ Business Model of the Project

One of the strengths in the water treatment field is our ability to propose reclaimed water and plant wastewater treatment technologies. Especially for oil & gas fields, the company proposes water-saving plants suitable for customers' needs and environmental constraints, considering the combination between wastewater reuse technology and optimum water balance such as selection of cooling systems and cascaded water application by qualities. At an oil refinery plant in Iraq, water intake from river can be reduced by the fine treatment for reuse of wastewater and rainwater generated in the plant. The company has constructed water-saving plants in Oman, Saudi Arabia, and Indonesia, mainly for the customers in oil & gas fields, such as national oil companies in the Middle East and oil majors. Since customers' interests in saving water consumptions are increasing due to higher unit cost of water treatment in recent years, there are more projects which require the study or design incorporation on water-saving plants, considering the optimization of both ecology (water resource conservation) and economy (capital and operational costs).

▲JGC's water saving plant

Related SDGs

■ Challenges and Responses in Business Expansion

A water-saving plant in proposal is not always attractive to customers, since it may also cause higher costs. Therefore, the company proposes the water-saving plant with conducting evaluations on both technical and economic aspets during FEED (Front End Engineering Design; Basic engineering phase) and EPC (Engineering, Procurement and Construction phase), considering that it can not only provide technical advantages but also provide economic advantages to the customer as reductions of capital and operational costs.

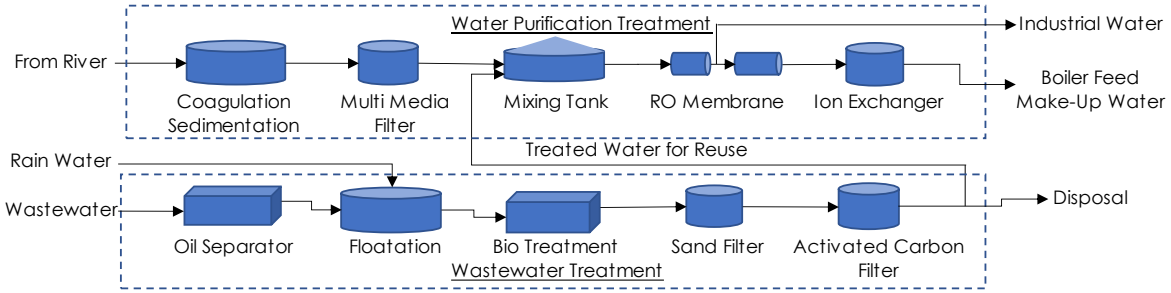
■ Key Success Factors

In addition to proposals from the viewpoint of the environmental impact mitigation by reducing water consumption, it is now possible to propose economic benefits by reducing construction and operation costs.

Product & Technology

The Iraqi oil refinery plant, which is currently under construction, plans to treat the wastewater generated by the refining process together with rainwater, and mix it with raw water for water treatment for reuse. The raw water for the water purification process is mainly from a nearby river, but advanced wastewater treatment technologies such as activated carbon have been introduced to ensure that the treated water quality for reuse is equal to or better than that of the river water.

On the other hand, river water, which is used as raw water, has been suffering from a decrease in flow rate in recent years, and its salinity is higher and higher due to the saltwater wedges. As a mitigation plan, by reusing treated wastewater, the company expects to be able to reduce river water intake by about 30%, which is equivalent to saving about 2 million tons of water per year. This technology is expected to contribute to the sustainable use of water resources by the mitigation of further river water reductions and saltwater wedges.



Challenges for Further Development

As the risk of climate changes becomes more apparent, it is expected that there will be greater awareness about the need to secure and sustainably use water resources, and the need to conserve water and reuse wastewater. The challenge is to establish cooperative relationships with customers from the earlier project phases, such as feasibility studies, to consider and introduce new technologies to improve plant reuse rates (zero wastewater discharge).

Profile of Project Company

Since its establishment in 1928 as Japan's first engineering company, JGC Group has expanded its business domain from oil & gas industries to infrastructure, and has conducted more than 20,000 projects in over 80 countries around the world. JGC Group is now engaged in comprehensive engineering, functional materials, and consulting businesses, mainly in the fields of energy, society and lifestyle, and industry. With "Enhancing planetary health" as a guidepost, the company aims to solve three social issues by making full use of the capabilities and achievements that have accumulated so far: "Pursuing both a stable energy supply and decarbonization," "Reducing the environmental impact and resource consumption," and "Building and maintaining vital infrastructure and services". Based on the concept that engineering is essentially a business activity that contributes to environmental conservation, JGC Group is contributing to constructing plants with smaller environmental impacts, manufacturing low-carbon and environmentally-friendly high-performance materials, and commercializing environment-related technologies.

Inquiry regarding this matter
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E-mail address: webmaster@jgc.com

52. Building sustainable water infrastructure with small-scale decentralized water recycling systems

WOTA Corp. https://wota.co.jp/en

Challenges Addressed | ② Droughts, ⑤ Water insecurity

Adaptation Challenge It is estimated that more than 40% of the world's population will face water shortages by 2030 due to issues such as drought and water pollution. In developing countries, access to water resources is an issue due to the high cost of desalination leakage and non-revenue water.

Contribution WOTA provides a "small-scale decentralized water recycling system" for residences, which can provide a safe and stable water supply without depending on surrounding water resources.

Project Detail

■ Background

Country | Antigua and Barbuda

WOTA aims to build a sustainable water infrastructure by implementing small-scale decentralized water infrastructure in addition to existing water and wastewater systems. In 2019, they launched “WOTA BOX”, a portable water recling system that enables compact and highly efficient water recycling, and in 2020 they launched the “WOSH”, a water circulation hand washing stand. After participating in COP26 with invitation from the British Royal Family, WOTA signed a basic agreement with the government of Antigua and Barbuda, a member of the British Commonwealth and a small island nation with limited freshwater resources, to resolve water issues on the island. It plans to begin demonstration tests in ordinary homes in 2024 (in Japan, multiple municipalities have already begun demonstrations). In the future, the company aims to introduce "small-scale decentralized water recycling systems" for residential use to provide a safe and stable water supply at low cost.

■ Challenges and Responses in Business Expansion

In developing countries, the challenge is to secure funding for initial installation costs. Therefore, the company seeks to reduce the cost of products through mass production by creating replicable “model cases” in islands and arid regions with funding from support programs and equity financing.

■ Key Success Factors

In contrast to existing advanced water/wastewater treatment plant water treatment technologies, WOTA has established a unique position by developing a "small-scale decentralized water recycling system" that is compact and achieves a high-water recycling rate.

▲Image of WOTA BOX

Related SDGs

■ Business Model of the Project

As with existing water supply and sewage systems, the government will bear the initial cost, and residents will pay a fee based on their water usage. In addition, a system for cooperation with local companies will be established for the operation of the system.

Product & Technology

System: Utilizing a water treatment process of filters, membrances, UV sterilization, and chlorine disinfection, etc., more than 98% of the wastewater is recycled and can be used repeatedly. These are managed by a unique water treatment autonomous control system. “WOTA BOX," a portable water recling system, and "WOSH," a water recycling hand washing stand, are currently on the market and have been introduced in hundreds of municipalities and commercial facilities. In response to the large-scale and prolonged water outage caused by the Noto Peninsula Earthquake, the company has provided water supply and drainage support to the entire peninsula. Currently, the company is focusing on the development of a "small-scale decentralized water recycling system" for residences that treats all wastewater onsite and allows it to be used repeatedly, and several municipalities have already begun implementing the system. The company is now working on mass production of the product for deployment in areas where it is difficult to renew aging infrastructure due to population decline, droughts, and other difficulties in developing water infrastructure.

▲Image of WOTA BOX

Challenges for Further Development

For developing countries, the company expects to first begin deployment as emergency infrastructure(Phase1), followed by adoption in public places such as schools and health centers(Phase 2), and finally to ordinary residences in villages and towns(Phase3). In the future, the company will continue to reduce initial costs through mass production and expand the deployment in areas where cost advantages can be realized.

Profile of Project Company

WOTA Corp. was founded in 2014 as a company committed to addressing and solving water issues from a structural perspective. Their goal is to transition from a society dependent on large-scale centralized water systems to one with sustainable, small-scale decentralized water systems. In 2023, WOTA was the first investment made by Japan Green Investment Corp. for Carbon Neutrality, a fund established by the Ministry of the Environment. Furthermore, the company was selected for the Ministry of Economy, Trade and Industry's "J-Startup" and "J-Startup Impact" programs. The "WOTA BOX" has a track record of use by the JICA International Emergency Relief Team during the Turkey-Syria earthquake, and plans are underway to expand to overseas island regions and arid areas.

Inquiry regarding this matter
Contact person: WOTA Corp., Liaison Officer, Asami
E-mail address: government.team@wota.co.jp

53. Building Water Microinfrastructure with IoT Compact Distributed Devices and Platforms

Waqua Co., Ltd. https://waqua.com/

Challenges | ②Droughts, ⑤Water insecurity

Adaptation Challenge Due to water shortages caused by drought and well water salinization caused by sea level rise, 2 billion people, or 1/4 of the world's population, do not have access to safe water resources.

Contribution Waqua will contribute to solving water problems around the world by developing small desalination equipment and building a water micro-infrastructure through IoT of equipment and platform.

Project Detail

■ Background

Country | Papua New Guinea, Philippines, etc.

In Papua New Guinea, a country with many remote islands and a dispersed population, residents have limited access to safe water due to the low rate of water supply in rural areas, and droughts have further exacerbated water shortages. Waqua, which aims to build water microinfrastructure around the world, used a JICA project in 2017 to implement a small desalination system in Papua New Guinea, confirming that it would improve the population's access to safe water. The local community responded that the device was very small and reasonably priced, and in 2018, additional deliveries were made at the request of a local member of parliament.

To date, it has hundreds of use cases in Japan and abroad, and has been deployed in more than 16 countries in Southeast Asia, Africa, and South America.

■ Challenges and Responses in Business Expansion

While there are many inquiries from overseas, it is difficult to deal with all of them due to the balance of resources. Due to the effects of global warming, water shortages will become more severe in the future, and attention will be paid to small-scale desalination technologies.

■ Key Success Factors

The world's smallest and lightest class of compactness and the accompanying low energy consumption, combined with IoT, will enable social implementation as a permanent infrastructure in areas where infrastructure is underdeveloped. In addition, mobile water supply to inland areas will also be possible as mobile infrastructure, and the production of small water supply vessels is envisioned to enable water supply in island countries without the need to install plants on every island.

▲Introduction of a small desalination system in Papua New Guinea

Related SDGs

■ Business Model of the Project

Small-sized desalination equipment is sold in areas where infrastructure is not yet developed. Users check the operation status of water quantity and water quality on the Web and perform maintenance such as changing filters. Waqua is also considering building a platform and utilizing acquired water quality data.

Product & Technology

The "MYZ" series of compact seawater desalination systems : Portable multi-purpose water purifiers capable of filtering seawater, river water, and dirty water to a level that meets the standards of Japan's Waterworks Law. By employing a proprietary and patented reverse osmosis filtration (RO) containment vessel, the world's smallest and lightest level has been achieved. It can operate with low energy, such as a 100 V power source for home use and solar power. The company is also developing a system that enables users to visualize the operation status of devices around the world. Registered with the United Nations Industrial Development Organization (UNIDO) Sustainable Technology Promotion Platform (STePP) as a health and hygiene-related technology.

Circulating hand washing unit "MYZ Oasys": Hand washing unit that can circulate water and can wash soap more than 1,000 times outdoors without running water. With approximately 100L of water, 1,000 handwashes (approximately 1,500L) can be performed with water quality equivalent to tap water, which is expected to save water. The unit is increasingly being used at civil engineering and construction sites, event venues, and large-scale factories. The cost of installing the system is one-fourth that of installing water supply and drainage pipes, thus reducing costs.

▲Small seawater desalination device
MYZ E-60

▲Circulating hand washing unit
Oasys

Challenges for Further Development

Since the adoption of both products in the construction industry is increasing, and they are often used continuously at construction sites for six months to more than one year, Waqua is accumulating knowledge as a permanent infrastructure rather than a temporary one. In the future, Waqua plans to expand these products to the domestic infrastructure market, and will also promote the construction of water microinfrastructure overseas, including in countries with more than 100 remote islands and well water salinization areas. In expanding business in developing countries, monetization is an issue, which is currently under ongoing study.

Profile of Project Company

Established in 2012. With the mission of realizing a smart water grid society, Waqua plans and develops water treatment related equipment such as small seawater desalination equipment and IT services. In 2013, the Innovation's Eye Award 2013 "Grand Prize," in 2020, a small desalination unit received the Good Design Award "Top 100," and in 2022, a recirculating hand washing unit received the "Governor's Award" at the 51st Okinawa Invention and Innovation Expo. In 2023, Waqua was selected as a "J-Startup 2023" by the Ministry of Economy, Trade and Industry.

Inquiry regarding this matter

E-mail address: info@waqua.com

54. Safe water supply through an automatic "pay-as-you-fetch" fee collection system for hand pumps

Sunda Technology Global Co. Ltd. https://www.sundaglobal.com/

Challenges Addressed | ② Droughts, ⑤ Water insecurity

Adaptation Challenge Many people in Uganda still obtain domestic and drinking water from unsanitary reservoirs. Supply from these surface water sources have become increasingly unstable due to droughts and floods, which are becoming more severe due to climate change. The installation of boreholes with hand pumps has been promoted as a stable means of obtaining safe water. However, due to the complexity of collecting water usage fees from residents and the unfairness of the cost burden, many boreholes have been left unrepaired as a result of the inability to self-sustain financially.

Contribution Sunda Technology Global introduces an automatic "pay-as-you-fetch" fee collection system on hand-pumped boreholes, enabling fair and transparent maintenance of these boreholes, and contributing to the promotion of sustainable and safe water use.

Project Detail

■ Background

Country | Uganda

In rural areas of Sub-Saharan Africa, the population with access to safe water is limited. As for Uganda, approximately 50% of the population currently has access to safe water from hand pump-equipped boreholes, but many still use unsanitary reservoirs. At present, more than 60,000 hand pumps have been installed nationwide, but the collection of fees and maintenance after installation poses a challenge, and about 30% of these boreholes remain broken and unrepaired. In order to solve the problems of hand pump-equipped boreholes, SUNDA , an automatic "pay-as-you-fetch" fee collection system that does not depend on human resources, has been developed.

■ Challenges and Responses in Business Expansion

When installing SUNDA equipment, it is necessary to hold a briefing session for the residents of the village where the equipment is to be installed to ensure that they understand that they will pay a water fee. It is difficult to gain the understanding of some residents who have an entrenched belief that water is free of charge unless careful and appropriate explanations are provided, However, by proceeding with the project as a government initiative and having local government leaders explain it directly to the residents, the company successfully gained their understanding.

■ Key Success Factors

The success of the SUNDA system was due to: (1) the company's ability to secure machine parts suppliers through its own network, established through the founder's experience in the Japan Overseas Cooperation Volunteers (JOCV); (2) the product design and maintenance system that enabled sustainable operation of the SUNDA system installed in Uganda; and (3) the acceleration of adoption and improvement of the SUNDA system as part of a JICA technical cooperation project.

▲ Conventional water source (reservoir)

▲ Hand pump-equipped borehole

▲ Installation of SUNDA system

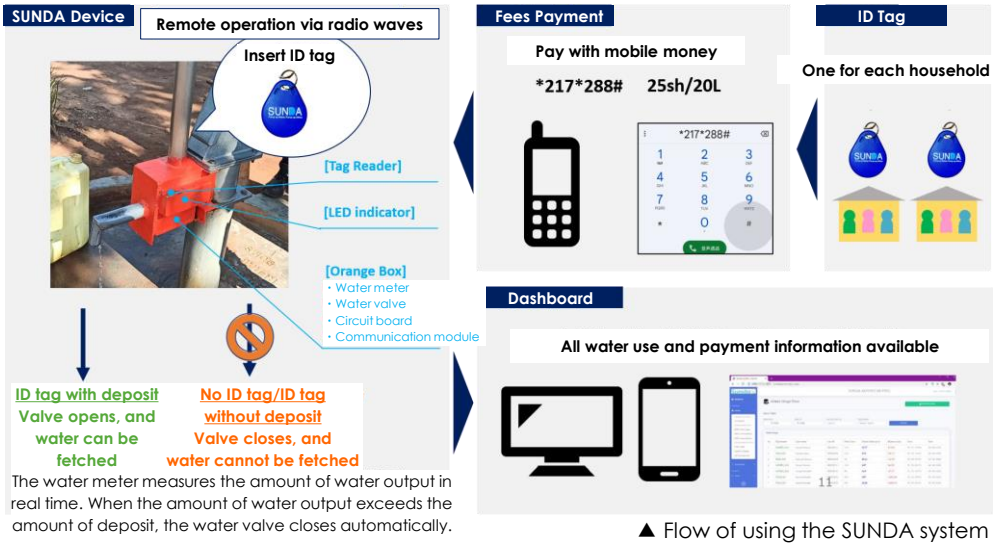
Related SDGs

■ Business Model of the Project

In Uganda, management of hand pumps by area service providers (organizations under the control of the Ministry of Water and Environment dedicated to maintain hand pumps) in each region has become more common in recent years. The SUNDA system will be sold to these maintenance contractors. The contractors will install the SUNDA system on the hand pump-equipped boreholes (both existing and new) and conduct initial maintenance, and Sunda Technology Global's local subsidiary will provide operational support thereafter.

Product & Technology

Automatic "pay-as-you-fetch" fee collection system for hand pumps "SUNDA": This system uses mobile money to collect water usage fees based on the amount of water fetched, and consists of an ID tag reader, water meter, water valve, circuit board, and communication module. The electricity required to operate the system is provided by an externally attached solar panel and battery. Users are provided with an ID tag, to which they charge (prepaid) mobile money and insert it into the SUNDA device, enabling them to use the hand pump. The fee is deducted based on the amount of water fetched, which can be confirmed via the monitoring dashboard on a PC or smartphone.



▲ Flow of using the SUNDA system

Challenges for Further Development

The company aims to solve the water problem as soon as possible through deployment throughout Uganda and to other African countries in the future. There are approximately 700,000 hand pumps throughout Africa, and it is needed to develop a mass production model and manufacturing system to be able to handle mass production on such a scale.

Profile of Project Company

Established in March 2020 as a start-up company in Kyoto, Japan. In July 2020, the Ugandan subsidiary Sunda Technologies Uganda was established. The company name "Sunda" means "pump" in Luganda, local language of Uganda. Under the slogan "Pump up Water, Pump up Africa," the company aims to create an environment that secures safe water in Africa through the provision of services including the SUNDA system. The company received the Japan Entrepreneur Award in 2021. In October 2021, the company has signed a memorandum of understanding with the Ugandan Ministry of Water and Environment to disseminate the SUNDA system countrywide.

Inquiry regarding this matter
E-mail address: info@sundaglobal.com

55. Minimizing financial losses caused by extreme weather events

Sompo Holdings, Inc. https://www.sompo-hd.com

Challenges Addressed | ⑩ Economic loss & livelihood failure

Adaptation Challenge The insurance product is an effective mean of minimizing financial risks and also an adaptation measure in the field of risk finance associated with climate change.

Contribution Sompo Holdings, Inc. has been providing the Weather Index Insurance in South Asia aiming at reducing agricultural business risks associated with extreme weather in Southeast Asian countries, where agriculture is a key industry that is vulnerable to climate change.

Project Detail

Country | Thailand, etc.

■ Background

The Sompo Group, in cooperation with Japan Bank for International Cooperation (JBIC), has carried out studies on risk finance approach to address climate change since 2007. Weather Index Insurance was launched for sale in 2010 in Northeast Thailand.

■ Business Model of the Project

Weather Index Insurance is an insurance product that pays out a contractually predetermined insurance amount when a weather index – such as temperature, wind speed, rainfall, or hours of sunshine – fulfills certain conditions regardless of actual losses. It enables a rapid claim handling and contributes to an immediate disaster restoration without a site investigation for a loss assessment.

In addition, it lowers the costs of loss assessment. Therefore, the product is highly evaluated as an effective mean for farmers in terms of rapid claim handlings and clear liabilities.

■ Key Success Factors

The development and provision of products and services are carried out through dialogue and collaboration with various stakeholders. This includes local farmers, agricultural development banks, and regional agricultural bureaus, among others. Through exchanges of opinions and information gathering on local weather conditions, the necessity of insurance, and product features, valuable know-how for product development has been accumulated.

Furthermore, the provision of Weather Index Insurance has the potential to influence national policies and has become a meaningful product for the development of agriculture in emerging countries.

▲Agriculture in developing countries

Related SDGs

■ Challenges and Responses in Business Expansion

There were challenges in designing insurance underwriting conditions that would be acceptable to agricultural producers and in identifying weather risks for crops that would be covered by the insurance. During the insurance design process, it was necessary to identify specific weather risks for insurance coverage, because weather risks such as drought, excessive rainfall, or high tempratures vary depending on the type of crop or the production region. Additionally, it was crucial to determine the duration of weather risks that affect crop growth and establish appropriate insurance periods. To achieve this, it was necessary to gather the required information or data for insurance composition from local government agencies and agricultural-related companies. In addition, conducting direct interviews with producers during on-site visits provided valuable insights into real weather risks, enabling the development of insurance products.

Product & Technology

Utilizing expertise acquired by weather derivatives products, the Sompo Group, in cooperation with JBIC, has carried out studies on risk finance approach to address climate change since 2007 Weather Index Insurance was launched in 2010 which is aimed to compensate rice farmers in Northeast Thailand for shortfall in crops caused by drought Sompo International Holdings Ltd which is responsible for the group's overseas insurance business, launched the AgriSompo initiatives as an integrated platform to offer agriculture insurance globally in 2017 Sompo Holdings Group launched a parametric weather insurance program for longan fruit farmers in Thailand in 2019 ..(Longan fruit is one of the major Thai agricultural exports. This insurance program was developed using satellite data with technology provided through AgriSompo Furthermore, in Thailand, in collaboration with Japanese companies, Weather Index Insurance for sugarcane farmers and cassava farmers was launched in May 2021.

▲(From the top:) Hearing Survey (Myanmar)
Briefing session(Thailand)

Challenges for Further Development

When we hear needs for the Weather Index Insurance and try to explore scheme construction and business development, it is necessary to consider both the social significance and the business benefit.

Profile of Project Company

Sompo Holdings, Inc. was established on 1 April 2010 as a holding company with a merger of Sompo Japan Insurance Inc. and Nipponkoa Insurance Co., Ltd., developing a range of businesses centered on the domestic P&C insurance, overseas insurance and reinsurance, domestic life insurance, nursing care & seniors, and digital businesses.

The Sompo Group incorporates the social challenges, strategies, and actions that the Group is tackling into our management framework, and is working to achieve Sompo's Purpose, which is expressed as "With 'A Theme Park for Security, Health and Wellbeing', create a society in which every person can live a healthy, prosperous and happy life in one's own way".

56. Strengthening farmers' resilience by providing weather insurance and microinsurance

Tokio Marine Holdings, Inc. https://www.tokiomarinehd.com/

Challenges addressed | ⑩Economic loss & livelihood failure

Adaptation Challenge Droughts, heavy rains, and global warming caused by climate change are causing serious damage to crops and destabilizing the livelihoods of farmers, especially in developing countries.

Contribution The Tokio Marine Group is contributing to strengthening farmers' resilience through financial inclusion efforts by developing weather insurance and microinsurance products and selling them to developing countries.

Project Detail

Country | India

■ Background

In India, crop production had been unstable due to irregular weather during the monsoon season (rainy season from June to September) and the rabi season (dry season from October to April), additionally, it has become even more unstable in the recent years due to the climate change. In 2001, the Tokio Marine Group formed a joint venture IFFCO-TOKIO General Insurance Co. Ltd. (IFFCO-TOKIO), a non-life insurance company, with Indian Farmers Fertiliser Cooperative Limited (IFFCO), which has 36,000 member cooperatives throughout India, and started selling insurance products to Indian farmers. The Indian government is putting an effort to sell insurance products, as a measure to improve the resilience of farmers and the livelihood of them. The weather insurance and microinsurance products sold by IFFCO-TOKIO is currently expanding to the size of 10 to 20 billion rupees (approximately 16 to 32 billion yen) per year.

■ Challenges and Responses in Business Expansion

It is difficult for foreign insurance companies to drive business on their own, and a local partner would be essential to build the sales network. Business roll out in India was only made possible by collaborating with IFFCO, which has member cooperatives all over India, and the weather insurance and microinsurance products offered by IFFCO-TOKIO are now indispensable products for stabilizing the lives of people in rural India.

■ Key Success Factors

The establishment of a joint venture with IFFCO, which has a network throughout India, has led to sales of insurance products due to trust in the IFFCO brand.

▲IFFCO – Tokio's Rural Marketing Team and rural area manager of IFFCO (at IFFCO's Grain Accumulation Center)

Related SDGs

■ Business Model of the Project

The government pays most of the premiums for government-managed weather insurance, which is currently the main product sold, and farmers pay only 1-2% of the premium to receive coverage. In providing insurance, the company uses multiple insurance companies to provide support in light of the risks involved.

Product & Technology

Weather insurance: To prepare for the risk of reduced grain yields due to abnormal or unfavorable weather conditions, premiums are paid according to the difference between the predetermined and actual criteria such as temperature and precipitation. It is now possible to provide agricultural insurance which is difficult to predict the risk, by leveraging the market research capability with local farmers and the underwriting know-how cultivated domestically over the years.

Currently, the company sells mainly government-sponsored products which the government assume most of the risks to stablizethe livelihoods of farmers in India, such as PMFBY (Pradhan Mantri Fasal Bima Yojana) and WBCIS (Weather Based Crop Insurance Scheme), to more than 4 million farmer households.

Micro Insurance: Since 2001, low-cost insurance products such as personl accident insurance(Sankat Haran Bima Yojna) etc. incidental to fertilizers, which customers can purchase for 1 rupee(= around 2 yen) annually, are being sold in the rural areas of India.

▲Fertilizer accident insurance in partnership with IFFCO

Challenges for Further Development

The Tokio Marine Group believes that, as part of its efforts to address climate change, it is important to provide not only insurance products but also solutions to enhance disaster resilience. In 2022 January, the disaster prevention consortium; CORE was launched with Tokio Marine as the initiator. By 2023 December, 109 companies had joined this consortium. In order to provide value by leveraging the knowledge of each subcommittee, Tokio Marine Resilience was established in November 2023 which conducts business related to disaster prevention and mitigation. It will aim to stregthen solutions related to climate change adaptation in the future.

Profile of Project Company

In 1879, Tokio Marine Insurance Company was established as Japan's first non-life insurance company. Currently, the company is expanding its business widely around the world in four business domains: domestic non-life insurance business, domestic life insurance business, overseas insurance business, finance and other businesses. As part of SDGs, the company contributes to creating a sustainable safe and secure society, by developing and providing products and services functioning as financial inclusionfor developing countries, resolving social problems by education of finance and insurance.

Overview of the Good Practices based by Business Area and Country (1/2)

(Inside the parenthesis is the Good Practice No.)

Business Area	Southeast Asia								South Asia					West Asia			
	Indonesia	Vietnam	Thailand	Myanmar	Malaysia	Philippines	Laos	Singapore	Bangladesh	Maldives	Nepal	Sri Lanka	India	UAE	Israel	Iraq	Oman
Resilient Infrastructure against Natural Disasters	・Disaster Prevention Information System (1) ・Rainwater Storage Underground Tank (10) ・Erosion Control Mats (13) ・Plastic Rainwater Storage Structure (14)	・Early Warning System (2) ・Wastewater treatment tank (3) ・Paving the ground with waste roof tiles and bricks (8)	・Drainage pump (3)	・Water Purification and Treatment Plant (3)	・Prevent surface soil erosion (5) ・Disaster prevention system (7) ・Pavement made of coal ash (12)	・River Water Level Alarm System (6) ・Disaster prevention system (7) ・Prolong the life of concrete (9) ・Erosion Control Mats (13)	・Rainwater Storage Underground Tank (10)	・Disaster Preparedness Database (11)	・Dual purpose pump (3) ・Disaster prevention system (7)	・Eco-friendly seawall (4)	・Prevent surface soil erosion (5)		・Disaster Preparedness Database (11)	・Steel Pipe (3)			
Sustainable Energy Supply	・Hybrid power generation control system (15) ・Solar LED Light (17)	・Solar Sharing (19)		・Solar LED Light (17)		・Wind turbines (16)											
Food Security & Strengthening Food Production Base	・Production Technology (21) ・High-quality cacao (22) ・Soap-based fire extinguishing agent (27)	・Wastewater treatment tank (3) ・Rice husk solid fuel production equipment (23) ・Autonomous drip irrigation system (26) ・Agricultural environmental control sheet (29)	・Drainage pump (3) ・Production Technology (21) ・Visualization and statistic processing of satellite observation data (28)	・Water Purification and Treatment Plant (3) ・Production Technology (21) ・Visualization and statistic processing of satellite observation data (28)	・Local Food Resource Recycling Solutions (31)		・Production Technology (21)		・Dual purpose pump (3) ・High-quality mung bean (25)		・Production Technology (21)	・Compost Plant (20)		・Steel Pipe (3) ・High-molecule film (24)			
Health & Sanitation	・Soap-based fire extinguishing agent (27) ・Long-lasting insecticidal net (33) ・Clean Water Supply System (37)	・Wastewater treatment tank (3)	・Drainage pump (3) ・Insect repellent cream (39)	・Water Purification and Treatment Plant (3)	・Underwater mechanical aerator and stirrer (36) ・Mosquito Catcher Air Purifier (40)	・Long-lasting insecticidal net (33) ・Heat barrier coating (38)	・Water purification technology (35)		・Dual purpose pump (3)		・Heat barrier coating (38)		・Water purification system (34) ・Mosquito Catcher Air Purifier (40)	・Steel Pipe (3)	・Water purification system (34)		
Climate Monitoring & Early Warning	・Compact X-band weather radar (42) ・Field data real-time observation system (46) ・Disaster Data Utilization Platform (47)	・Early Warning System (2) ・Compact X-band weather radar (42) ・Non-contacting Radar (44)	・Visualization and statistic processing of satellite observation data (28) ・Early Warning System (43)	・Visualization and statistic processing of satellite observation data (28)	・Disaster prevention system (7)	・River Water Level Alarm System (6) ・Disaster prevention system (7) ・Wind turbines (16) ・Data analysis platform (41)		・Compact X-band weather radar (42) ・Disaster Preparedness Database (11)	・High-quality mung bean (25)				・Disaster Preparedness Database (11)				
Secure Resources & Sustainable Water Supply	・Clean Water Supply System (37) ・Plastic Rainwater Storage Structure (14)	・Autonomous drip irrigation system (26) ・Water leakage detection technology (48)	・Plastic Rainwater Storage Structure (14)		・Underwater mechanical aerator and stirrer (36)	・Compact seawater desalination systems (53)	・Water purification technology (35) ・High-turbidity raw water-compatible water purification system (50)						・Water purification system (34) ・Water leakage detection technology (48) ・Rainwater harvesting system (49)	・High-molecule film (24)	・Water purification system (34)	・Water-saving plant (51)	・Water-saving plant (51)
Climate Change Finance			・Weather Index Insurance (55)										・Weather insurance and microinsurance (56)				

Overview of the Good Practices based by Business Area and Country (2/2)

(Inside the parenthesis is the Good Practice No.)

Business Area	West Asia	East Asia		Africa									South America		Central America	Oceania	Caribbean Sea
	Saudi Arabia	Mongolia	China	Uganda	Senegal	Kenya	Ethiopia	Ghana	Madagascar	Benin	Rwanda	Nigeria	Brazil	Chile	Costa Rica	Papua New Guinea	Antigua and Barbuda
Resilient Infrastructure against Natural Disasters													・Disaster prevention system (7)				
Sustainable Energy Supply		・Solar Farm (18)				・Solar Farm (18)								・Solar Farm (18)			
Food Security & Strengthening Food Production Base			・High-molecule film (24)	・Production Technology (21) ・Enhancement of salt tolerance of plants (32)	・Rice husk solid fuel production equipment (23)	・Solar Farm (18)						・Microfinance (30)		・Solar Farm (18)			
Health & Sanitation			・Water purification system (34)		・Clean Water Supply System (37)	・Heat barrier coating (38)	・Long-lasting insecticidal net (33)	・Long-lasting insecticidal net (33)	・Clean Water Supply System (37)	・Clean Water Supply System (37)			・Long-lasting insecticidal net (33)		・Long-lasting insecticidal net (33)		
Climate Monitoring & Early Warning											・Lightning Arrestors (45)		・Disaster prevention system (7)				
Secure Resources & Sustainable Water Supply	・Water-saving plant (51)		・High-molecule film (24) ・Water purification system (34)	・Automatic fee collection system (54)	・Clean Water Supply System (37)				・Clean Water Supply System (37)	・Clean Water Supply System (37)						・Compact seawater desalination systems (53)	・Water recycling system (52)
Climate Change Finance												・Microfinance (30)					