

"Project Formulation Survey" under the
Governmental Commission on the Projects
for ODA Overseas Economic Cooperation
in FY2013

Summary Report

The Republic of Peru

The Project Formulation Survey for
Strengthening Water Supply System for
Communities during Emergencies through
Application of Electric Power-free Water
Purification Tank

March 2014

Consortium of Kiwa Kogyo Co., Ltd., and IC Net Limited

The content of this report is a summary of the project formulation survey, which was commissioned by the Ministry of Foreign Affairs of Japan in the FY 2013 and is carried out by the consortium of Kiwa Kogyo Co., Ltd., and IC Net Limited. It does not represent the official view of the Ministry of Foreign Affairs.

Introduction

The purpose of this project formulation survey (hereinafter the “survey”) was to identify the current issues and needs on disaster prevention, in particular, water supply system during emergencies in the Republic of Peru (hereinafter “Peru”). The survey team examined the feasibility of 1) strengthening water supply system for communities during emergencies in Peru utilizing the products of small and medium enterprise (SME) of Japan, in this case Kiwa Kogyo Co., Ltd. (hereinafter “Kiwa Kogyo”), in projects of Japan’s official development assistance (ODA); and 2) the consequent business development of the company.

The survey was conducted from October 2013 to December 2013 by the team formed by Kiwa Kogyo, the manufacturer of the electric power-free water purification tank, and IC Net Limited, a consulting firm specializing in international development assistance.

I. Description of the current situation and development needs of the concerned development issues in the surveyed country

Peru is located in Western South America, has a population of approximately 29 million, and strong historical ties with Japan. Peru has recorded an average annual economic growth of 6.4 percent over the past ten years, thanks mainly to a healthy increase in the export of natural resources, which, along with other factors, has helped the country recover from severe economic downturn and acute social instability from the early 1980s to the mid-1990s. Peru today ranks among Latin America’s most steadily growing countries.

Although Peru is known for unparalleled geographic and climatic variation, its territory can be roughly divided into three climatic zones: the arid coastal area where rain is extremely scarce; the year-round cold Andean Mountain area where the year is largely split into rainy and dry season; and the Amazon tropical forest where rain is abundant throughout the year.

Peru has historically been affected by different types of natural phenomenon including but not limited to earthquake, tsunami and volcanic explosion. Earthquakes are registered in every region. Climatic changes and El Niño, which manifests itself in the forms of heavy rain or draught, depending on geographical and climatic conditions, trigger secondary effects such as flood and landslide. Key lifelines are often severed by these natural disasters, disturbing local residents’ livelihood.

In line with the Hyogo Declaration of 2005, Peru’s National Disaster Risk Control System replaced the four-decade old National Civil Defense System in 2011. The new system, currently in its transitional phase, prioritizes prevention of, and preparation against, different types of natural and man-made disasters, echoing both bi- and multilateral aid policies, which adopt the perspective of disaster mitigation in the overall development strategy. Notwithstanding these developments, in regards to the provision of safe drinking water during emergencies, neither a well-structured need-oriented distribution system nor an effective quality control system is in place, which is true to both private and public sectors, due mainly to the lack of capacity of related institutions and/or challenges of road access.

The three pillars of Japan’s aid policies for Peru are to address economic and social disparities, environmental issues, and disaster prevention. With regards to the third pillar, Japan’s aid activities in Peru include the following: emergency aid grants in the aftermath of El Niño (1997–1998) and the 2007 earthquake; assistance in promoting recovery through provision of machinery and equipment for repairing public buildings; technical cooperation projects for enhancing anti-

earthquake/tsunami know-how and technologies; and elaboration of disaster prevention master plans to introduce an earthquake/tsunami alert system.

II. Possible applicability of the SME's products and technologies, and prospects for future business development

Kiwa Kogyo, a firm that is based in Kochi Prefecture, Japan, and provides waterworks- and construction-related services and manufactures relevant equipment items, produces *Bousai-ou* an electric power-free water purifying tank. The strength of *Bousai-ou*, which means “the king of disaster prevention” in Japanese, lies in its capacity to secure safe drinking water even when circumstances do not provide for any other means, by combining a massive water tank with a highly effective water filter. Here are details of *Bousai-ou*'s advantages: 1) *Bousai-ou* does not depend on electricity or any other type of energy supply: gravity is the sole mechanical impulse that helps channel and purify water. It is lightweight and does not require major engineering techniques. It is most effective when the water system is disrupted by disasters. 2) *Bousai-ou*'s filter, a *Toray* Hollow Fiber Membrane Filter, is comparable to the high-performing microfiltration (MF) membrane commonly used in Japan's water treatment plants capable of eliminating coliform and other types of bacteria and thus meeting the sanitary standards set forth by the World Health Organization (WHO). Easy and routine maintenance will keep *Bousai-ou*'s simple structure working almost uninterruptedly.

The above features of *Bousai-ou* can help address the critical needs during emergencies in Peru. The promotion of *Bousai-ou* in the country is Kiwa Kogyo's main strategy for developing markets overseas. The firm will use the project formulation survey as the basis for conducting further market study. Among the firm's principal activities afterwards will be testing prototypes, obtaining feedback for developing new products, and preparing necessary conditions for carrying out business.

The following are the expected impacts on Kochi Prefecture's economy from Kiwa Kogyo's entrepreneurial undertaking. In Kochi Prefecture, also known for its geographic vulnerability against threats of natural disasters, local businesses with know-how and technologies for disaster prevention have thrived as a unique industrial cluster under the local government's strong support. Kiwa Kogyo's business launch in Peru is expected not only to bring about immediate economic gains within the cluster, but also to stimulate demands for related products and inspire other local entrepreneurs to follow the company's footsteps. The proposed ODA project will also provide Kiwa Kogyo with opportunities to improve its product through a cycle of overseas piloting and reengineering, helping boost the local industry's international competitiveness as a whole.

The initial stage of the proposed scenario for Kiwa Kogyo's business development in Peru consists of building a solid platform from which full-fledged commercial activities will take off. In this stage, Kiwa Kogyo will establish working relationships with local and domestic sales agents as well as local manufacturers whose operations will be closely monitored from Japan and directly and indirectly assisted by the company's engineers who will also travel to Peru whenever necessary.

Immediate potential consumers are the approximately 10,000 local schools and medical clinics, in addition to the 200 or more “eco-lodges” scattered throughout the regions surveyed. The estimated initial number of *Bousai-ou* to be installed using Japan's ODA scheme is 260. In the meantime, feasibility of cost reduction through partial localization of *Bousai-ou* will be studied with future projections of obtaining higher commercial sales margin.

Complete products will be shipped from Japan in the short run, while possibility of combining locally-produced, low-cost water tanks with a Japan-made water-purifying unit will be evaluated in response to a number of requests by the interviewees who showed an interest in using *Bousai-ou* for different ends. This step is therefore deemed necessary for expanding markets for *Bousai-ou*.

The initial sales scheme will involve local commercial agencies run by Japanese nationals with ample business experience in Peru. It is also likely to be effective to establish strong ties with Japanese trading companies specialized in South America and with broad networks in the country.

Even with Kiwa Kogyo's limited capacity to assign international sales personnel, good cooperation and coordination with trustworthy partners, to whom a major portion of the actual operation can be entrusted, could help minimize potential risks and maximize administrative efficiency. This business model will enable Kiwa Kogyo to monitor local operation through these partners, travel to Peru when needed for providing technical assistance and gathering ideas for developing new products.

JICA's Pilot Survey for Disseminating SME's Technologies (hereinafter the "Pilot Survey") will serve as the major stepping stone for Kiwa Kogyo's business development in Peru, following the conclusion of the project formulation survey. Around the mid-term of the Pilot Survey, other ODA schemes will be adopted, together with activities aiming at promoting general consumption. Product reengineering and additional marketing will take place to materialize general sales within a maximum of one year after the conclusion of the Pilot Survey.

In accordance with the above schedule, a simulation of *Bousai-ou*'s sales through ODA and other financial schemes with 260 units of *Bousai-ous* sold over a period of five consecutive years indicates that Kiwa Kogyo's business will achieve stable growth within seven years, with substantial demand for ODA schemes in the first few years, then followed by business for private sector which may commence in 2017.

Proliferation of fake replica is one among possible risks. Although *Bousai-ou* is now registered as a utility model in Japan, obtaining an international patent for it is a challenge. It is beyond most SMEs' capacity to prevent copyrights violations abroad from affecting their businesses. Possible measures to mitigate possible damage is to promote a brand image through a well-publicized government purchase under the assumption that the circulation of copied products is inevitable but the public would eventually opt for certified ones, as well as obtaining an international patent.

III. Verification of adaptability of the SME's products and technologies to the surveyed country (Demonstration and Pilot Survey)

The survey team identified issues to be addressed during the Pilot Survey for attaining further sales expansion, although no actual market test was performed this time. The issues are as follows: 1) diversify water sources; and 2) increase the size of the water tank, and enhance purification capacity. The first issue is based on a number of suggestions made on the usage of alternative water sources. A quick quality test performed with samples taken from springs, rivers, streams and rainwater as a control sample revealed that no major obstacle existed for the former two and rainwater while the third might require closer examination. An exercise on the possibility of replacing the current water tank with other alternatives made it clear that polyethylene or stainless tanks (with capacities between 1,000 liters and 5,000 liters) available in Peru could be a substitute.

With regards to the profitability of *Bousai-ou*, simulations were made for the two types of *Bousai-ou*, i.e., the current model and the modified one with a localized water tank, both shipped in 20-foot containers. The simulations demonstrated that the modified model would produce higher profits. Therefore, replacement of *Bousai-ou*'s original water tanks by the local ones at an early stage, most likely following the initial sales through the ODA scheme, is highly recommendable.

IV. Expected development impact and effect on business development of the proposing SME in the surveyed country through proposed ODA projects

Bousai-ou, with its unique capacities of accumulating and filtering water, can help solve the challenge of securing safe drinking water during emergencies in Peru that are caused by two principal factors, i.e., 1) insufficient amount of water supply, and 2) inadequate handling of distributed water.

Below are the expected effects of implementing a project featuring *Bousai-ou* as its principal instrument.

Application of this product can help secure emergency water supply, enhance local government capacities to plan rescue and relief activities, and raise local residents' awareness of the need to safeguard water hygiene. Activities focused on these three themes are expected to establish wide recognition of *Bousai-ou*'s crucial role among government officials in charge of promoting local residents' preparedness against natural disasters. This will also help *Bousai-ou* expand its sales opportunities beyond government purchase and tap into a greater market.

Such expansion of sales opportunities will be enhanced through the development of new products capable of meeting diverse market needs that the current *Bousai-ou* does not. Kiwa Kogyo is planning to introduce new models of *Bousai-ou* during the implementation of ODA projects, including the Pilot Survey. Thus the experience of implementing an ODA project will serve Kiwa Kogyo as part of the gradual learning process to study possibilities of reducing operation costs and developing new products while promoting *Bousai-ou*.

V. Proposals for formulating ODA projects

The objective of the proposed Pilot Survey is to "help mitigate challenges in the provision of drinking water during emergencies," which is expected to be achieved from the following two project outcomes. The first outcome, i.e., "Communities' water provision system during emergencies is strengthened," has the following indicators: "1-1: Installation of equipment for securing an optimum amount of water-supply" and "1-2: Development of governments' capacities to effectively and efficiently use the water tank." The second outcome, i.e., "Methods to keep water quality at optimum level is enhanced," has the following indicators: "2-1: Treatment of water is enhanced," and "2-2: Maintenance of water tanks is improved."

The Pilot Survey is not designed to be a stand-alone, one-time undertaking. It is meant to be an inception point of broader effort with a variety of ODA schemes, such as technical cooperation and equipment donation, sharing common goals and producing synergy effects among them.

With the Non-Project Grant Aid for Provision of Japanese SMEs' Products, *Bousai-ou* can be installed in the disadvantaged Amazon and Andean regions under the Ministry of Housing, Construction and Sanitation's *Los Tambos* Project, which envisages construction of government-

administered warehouses equipped with multiple relief supplies. Installation of *Bousai-ou* in local government buildings could be realized through the Grant Assistance for Grass-Roots Human Security Projects. One viable type of technical cooperation project is the Bilateral Technical Cooperation Project; the JICA Partnership Program is another. The Pilot Survey will have special importance because it will contribute significantly to creating Kiwa Kogyo's commercial platform in Peru and enabling a smooth transition from the ODA-oriented operation to extensive commercial transactions.

The Pilot Survey is designed to take place in four regions in three climatic zones, i.e., Arequipa and Cuzco in the Andean region, Loreto in the Amazonian region, and Tumbes in the arid Pacific coastal region. Its objective will read as follows: "*Bousai-ou* will contribute to the creation of an effective and efficient water supply system." Activities during the Pilot Survey include identification of sales partners, establishment of a sound sales system as well as strengthening local governments' capacity for distributing safe drinking water during emergencies in accordance with the principle of "self-help" and "mutual help". The corresponding outputs are listed below:

Output 1: Sales and distribution channels are developed.

Output 2: Application of *Bousai-ou* contributes to building local governments' capacities in formulating disaster prevention plan.¹

Output 3: Application of *Bousai-ou* contributes to raising local residents' awareness and building capacities in handling drinking water.

Planned main project inputs are 15 to 20 units of *Bousai-ou*, five water-purifying units, and 10 locally made water tanks and water-test kits.

The National Institute of Civil Defense (*Instituto Nacional de Defensa Civil*: INDECI) will be the agency responsible for supervising the overall Pilot Survey outcome. INDECI regional offices, the Ministry of Health, and the Ministry of Education with their respective regional offices, regional governments, and district governments will also take part in the survey's coordination committee.

As for in-kind equipment donation, 100 units of *Bousai-ou* are to be installed in the areas covered by the *Los Tambos* project under the Non-Project Grant with Small- and Medium-Scale Industries. Under the Grant Assistance for Grass-Roots Human Security Projects, *Bousai-ou* can be proposed as necessary items for better preparing public institutions, such as schools and medical clinics, against disasters in Arequipa, Loreto, Puno and Tumbes. A possible form of technical cooperation is a project with the INDECI Arequipa Office where Peru's only Civic Emergency Drill Center is located. Methods devised through the experience of building local government capacity for formulating and implementing counter emergency plans can be replicated in other regions as a model case. The JICA Partnership Program with the Loreto Regional Government's Emergency Center aims at strengthening local residents' capacities of handling drinking water with technical support from Japanese NGOs. The program could also be linked to JICA's sanitation project in the Peruvian Amazon region.

With regard to the project of the Ministry of Housing, Construction and Sanitation, it is currently conducting a preliminary study for selecting target communities in Nauta and San Juan Bautista,

¹The disaster prevention plan mentioned here refers to a plan that helps secure safe drinking water during emergencies, which could also form part of, and eventually serve as a prototype of a more comprehensive disaster prevention plan. A model scheme for disaster prevention planning is expected to be created and diffused during the technical cooperation project, later.

both of which are close to Loreto's capital in the Peruvian Amazon region. As the Pilot Survey advances, possibilities of introducing *Bousai-ou* as a means for complementing conventional water ways could also emerge. As for the latter, the Peruvian Association of Local Government Administration is the supposed counterpart. With their support, *Bousai-ou* could be installed in local schools and medical clinics in one of the regions visited by the survey team, namely Arequipa, Loreto, Puno, Tumbes and Cusco where higher interests may arise. Installation of 50 units of *Bousai-ou* is considered adequate given the average amount of investment allowed, i.e., approximately 50 million JPY, under this scheme.

INDECI, the prospective counterpart for the Pilot Survey, acknowledged *Bousai-ou*'s effectiveness as an essential tool for helping enhance the resilience of government and local residents against disasters, and expressed their interest to the Pilot Survey and their willingness to cooperate for it. (Please refer to the attached meeting minutes for details.)

Attachment: Outline of the Survey

Attachment: Outline of the Survey

Project Formulation Survey on Strengthening Water Supply System for Communities during Emergencies through the Application of Electric-power Free Water Purification Tank in the Republic of Peru

SMEs and Counterpart Organization

- Name of SME: Kiwa Kogyo Co.
- Location of SME: Kochi Pref., Japan
- Survey Site/Counterpart Organization: Provinces of Puno, Loreto, Arequipa, Tumbes, Lima and Cuzco /INDECI (National Institute of Civil Defense) and others

Concerned Development Issues

- Limited access to safe drinking water during disasters:**
- **Effects of natural disasters:** Water sources are often destroyed and/or polluted by floods, debris-avalanche, earthquake, tsunami, volcanic eruption among others, and so are key lifelines including public waterworks.
 - **Water supply system during emergencies:** Drinking water provided by the central and regional government agencies hardly reach every effected area.
 - **Handling of drinking water during emergencies:** Measures for purifying and/or disinfecting drinking water are not strictly applied, and as a result, possibilities of health hazards emerge.

Products and Technologies of SMEs

- **Bosai-ou :**
(*Bosai*= “King of Disaster Prevention”)
 - It is a purification tank that converts rainwater into safe drinking water.
 - It is light-weight and electric power-free.
 - It can be used in remote areas where public waterworks are absent both during emergencies and ordinary times.



Proposed ODA Projects and Expected Impact

- **Technical Cooperation Project:** Through application of *Bousai-ou*, it aims at strengthening the capacities of local government and communities for planning and implementing measures that help enhance preparedness against the risks of natural and man-made disasters.
- **Non-Project Grant with Small- and Medium-Scale Industries:** It aims at promoting installation of *Bosai-ou* in local communities to enable access to safe drinking water during emergencies.

Future Business Development of SMEs

Assuring universal access to safe drinking water is a challenge in Peru. Especially in areas where adequate public waterworks is absent, local residents remain extremely vulnerable against threats of natural disasters. Partial localization of *Bousa-ou* could help reduce its costs, making its diffusion possible not only in Peru but also throughout Latin America, and so could establishment of an effective business model.