

## A Medium-Sized Japanese Company Taking on a Challenge to Improve Water Conditions in Laos

Verification project with the private sector for spreading Japanese technologies for water purification systems for enhancing small town water supply in a developing country

Although Laos has set a national development goal to have a water supply coverage rate of 80% in urban areas by 2020, the rate remains at only 67% as of the end of 2014. In addition, it has become an urgent matter to purify river water stably at a low price, because quality groundwater resources are facing a shortage.

Bolikhamxay Province's Paksan, a small city in central Laos, has water supply using groundwater, however, there were issues with chronic water shortages and also water quality problems such as the inability to thoroughly remove impurities like calcium contained in the groundwater. In view of this, TOHKEMY CORPORATION, a company with headquarters in Osaka, through JICA's Framework for Supporting Japanese SMEs in Overseas Business (now referred to as the SDGs Business Supporting Surveys), implemented a dissemination and verification project to confirm the usability of its water purification equipment for introduction to the country, to enable the use of river water as tap water from June 2015 to May 2018.

TOHKEMY CORPORATION is a supplier that sells filtration materials and equipment to water treatment companies and water purification plants in Japan. However, as the company cannot expect growth and expansion of its business in the Japanese domestic market due to the fact that water supply coverage rate is over 99% in Japan and their business will be centered on maintenance and management in the near future, the company has sought business opportunities in developing countries where the waterworks system is not adequately developed. Mr. HOSOTANI Takuya, Director of TOHKEMY CORPORATION tells us about how they decided to start the project in Laos as follows.

"Although Japanese water treatment companies had already operated in China, Thailand, and Viet Nam, countries which have been developing in Asia, they had not yet entered Laos because it is a landlocked country with a smaller market on the Indochinese Peninsula. Therefore, our company thought that providing water treatment equipment itself would lead to business opportunities, and decided to implement the project in Laos."

The project started this way, but faced a challenge because the turbidity level of the water of rivers, such as the Mekong River, the water source in Laos, becomes very high when rain falls during the rainy season, and the typical water purification system used for piped water in Japan cannot purify the water properly and adequately. Normally in Japan, in such cases, a chemical agent would be added to accelerate the settlement of mud, the primary cause of turbidity. When the level of turbidity is extremely high, it is possible to consider adding a chemical agent containing a polymer compound, but these are prohibited in Japan, as they could be harmful to the human body if consumed in large quantities.

Thus, TOHKEMY CORPORATION introduced a new method utilizing its unique technology of Fiber Filters (Actifiber), which uses special fibers for pre-treatment in the filtration process of turbid water, and successfully purified the water without using polymers and with lower amounts of other chemical agents.



Inside the water purification plant in Paksan, Bolikhamxay Province constructed with the project. Staff of TOHKEMY CORPORATION giving guidance to local employees on how to operate the water purification equipment. (Photo: TOHKEMY CORPORATION)



Staff of TOHKEMY CORPORATION giving instructions on maintenance techniques for the equipment to measure the water purity level at the completed water purification plant (Photo: TOHKEMY CORPORATION)

Through this project, implemented over about three years, it became possible to supply a daily average of 800 tons and an annual accumulated total of around 300,000 tons of drinkable water to the residents of neighboring areas. This is equivalent to the amount of consumption for approximately 1,000 households (around 6,600 people), and led to the increase of the water supply coverage rate of the area increasing from 69% to 88%. In addition, through TOHKEMY CORPORATION's water purification equipment, it became possible to use large quantities of clean water taken from rivers. This lowered the amount of groundwater consumption, which had quality problems, and resolved the quality issue of piped water. The local people raised their voices with delight one after the other, stating as follows: "We finally have piped water," "I'm happy that I can use water at any time, 24 hours a day," "My dishes become very clean when I wash them with the new water," and "This is the first time I've experienced my hair becoming silky after washing it."

Throughout this project, TOHKEMY CORPORATION placed particular importance on utilizing local resources and manpower. For example, they tried to procure parts made in Laos as much as possible, so that they could lower costs for transporting parts from Japan, and also created local employment. In addition, for maintenance and management after the installation of the water purification equipment, a technology transfer was implemented concerning the equipment's operation and maintenance to three officials of a water supply company in Bolikhamxay Province. Even after the completion of the project, TOHKEMY CORPORATION continues to provide maintenance support through a local agency and others, and appropriate and smooth operation of the equipment is continuing. TOHKEMY CORPORATION is considering working on human resources development, including for engineers, in Laos. This project, which placed importance on local job creation as well as appropriate operation even after the project's completion, received high recognition from the local Department of Water Supply and the Government of Laos. After its completion, the project has also led to the business expansion of the company in Laos, as it received orders for filtration equipment from the Bolikhamxay Province Department of Water Supply.

Director Hosotani tells us the following about what the company achieved through this project.

"Our business in Laos is only halfway through, and it is not an easy job. However, we are attracted to the large markets abroad, which cannot be expected in Japan any more, and would like to develop our business in a holistic manner, including the sales of various products related to water purification equipment in the future. In addition, all the staff of TOHKEMY CORPORATION are pleased that our company's products are being used in developing countries and that the local people appreciate them, and this has led to increasing our motivation for our daily work. Furthermore, we feel that the project in Laos has brought about many other positive effects for the company, including an increase in the number of women and young people wishing to join our company because of our overseas business."

## Japanese Software Dramatically Changing Primary Mathematics Education at Elementary Schools

An SME initiative in Rwanda, which aims to become an ICT leader

Since the inauguration of President Kagame in 2000, Rwanda has aimed to become a leader in the information and communication technology (ICT) field and has focused on the increased use of ICT and human resources development. However, due to several reasons, including a low mathematics proficiency level in primary education as well as factors such as a lack of available educational software, Rwanda faced difficulty in utilizing ICT in educational settings. In response to this situation, SAKURA-SHA K.K., a company with its headquarters in Tokyo that develops and sells mathematics software for elementary schools in Japan, has been conducting a verification project to introduce its original mathematics software in elementary schools in Rwanda since October 2018 through JICA's SDGs Business Supporting Surveys for SMEs framework.

During his visit to Rwanda for the purpose of designing and developing software for the country, Mr. YOKOYAMA Kenya, President and Chief Executive Officer of the Japanese company, saw children struggling with even simple calculations. The children seemed to have difficulty in performing simple mental arithmetic calculations, because even to answer an addition such as "3+4," they would draw as many circles as the numbers in the formula, and then count the number of circles to answer the question. In addition, the students did not have their own textbooks, and during class, they seemed to quietly listen to teachers giving non-interactive lectures from a platform. Mr. Yokoyama saw this situation and felt that his company could potentially contribute to improving the quality of education in Rwanda by introducing mathematics software developed by SAKURA-SHA.

Another reason that encouraged the implementation of this project was the high distribution rate of computers in Rwandan elementary schools. As part of a national policy to strongly promote ICT, computer terminals themselves were widely distributed, and most elementary schools in Rwanda had computers for student use. However, those computers were rarely utilized in many schools because educational software had not been developed. Mr. Yokoyama thought that if his company's mathematics software could be provided, it might help utilize those unutilized computers and offer a new education style that makes learning fun for the children.

However, there were various challenges in developing mathematics software for Rwanda. Firstly, the company had to build a new software from scratch, because it was not possible to use the programs utilized for software in Japan due to the difference of specifications between the computers used in the elementary schools in Rwanda and those that are generally used in Japan. The second challenge was the language. In order to develop software that conforms to the contents of Rwandan textbooks, it was necessary to understand all of the textbooks written in Kinyarwanda. Mr. Yokoyama, with his long teaching experience as a former elementary school teacher as well as work experience in developing teaching materials in Japan, took approximately one year to comprehend the textbooks himself and then



Children enjoying a class, using the mathematics software developed by SAKURA-SHA (Photo: SAKURA-SHA)

supervised the software development work. Mr. Yokoyama tells us the points that the software development team paid particular attention to when developing the software were as follows:

"If you are just translating the contents of the software, excluding mathematical formulas, that have been developed for Japanese schools from Japanese into Kinyarwanda, it is relatively easy to develop the software. However, we thought that it would be difficult for the local schools to accept such software as it would not conform with Rwandan textbooks and curriculum. Therefore, we studied Rwandan textbooks thoroughly and developed software contents in line with their teaching style. We also incorporated creative ideas to make the software fun to use for local children; for example, we changed an icon that children operate when launching the software from a ninja in Japan to a gorilla in Rwanda."

The mathematics software for Rwanda was completed through the abovementioned process. The next concern was whether Rwandan teachers, who were used to providing non-interactive lectures and not accustomed to interactive instructions, would accept the new lesson method using the software. However, their teaching style improved after the teachers actually tried out the software and experienced its fun aspects, which can be operated like a game.

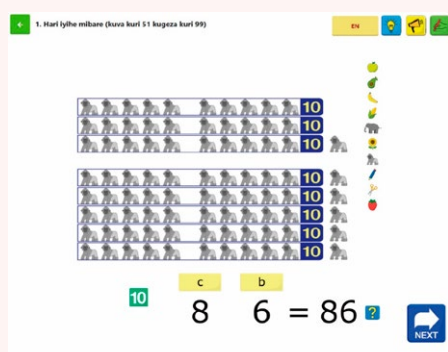
Ms. MACHIDA Mariko of SAKURA-SHA notes, "In actual classes, I saw teachers walking around the classroom, using the software with students and giving them advice at their desks, which was previously unthinkable in the lesson style in Rwanda."

The reactions of the students during class were also wonderful. As characters move and make sounds when the software is operated, Rwandan students, who until then did not have textbooks and sometimes just stayed seated without understanding the lectures, would now actively attend classes, talking with their teachers with a smile. As a result, there were major achievements, such as a dramatic improvement in academic performance at all schools that introduced the software on a trial basis. Even more, one class reported a surge in the rate of questions answered correctly from 12.6% to 64.3% after a week of intensive lessons using the software.

Mr. Yokoyama shares with us his following future goals.

"By 2021, we plan to introduce the mathematics software on a trial basis in more elementary schools in Rwanda to verify its learning effect. Introduction of the software has received positive responses from the Rwanda Education Board and school educators, with an elementary school using the software having been selected as a candidate to receive a visit by the President of the country. We will continue to cooperate with stakeholders in Rwanda and ultimately aim to bring the mathematics software to all public elementary schools in the country."

Initiatives are steadily advancing in Rwanda, where contents from Japan are transforming mathematics education, which, in turn, bring about positive changes to the future of the children and also to the country itself.



A screenshot of the mathematics software developed for Rwanda (Photo: SAKURA-SHA)

## Toward Constructing Smart Cities in India Aimed at Realizing a Society with Low-Carbon Energy

### Academic cooperation between Japan and India

In urban areas of India, serious traffic congestion and air pollution have been caused by a sudden increase in traffic volume with economic development. This has become a major problem affecting not only general economic activities, but also the residents' health. Moreover, from the perspective of global warming, it is necessary to reduce CO<sub>2</sub> emissions from vehicles. It has become an urgent matter to increase the energy efficiency in the transportation sector, and the Government of India has set a policy to make 100 cities environmentally-friendly "smart cities"<sup>\*1</sup>. It aims to improve traffic congestion and reduce CO<sub>2</sub> emissions by promoting a multi-modal system<sup>\*2</sup>, which makes efficient use of a combination of various transportation methods, especially public transportation such as subways and buses.

In order to support this initiative by the Government of India, a research group led by Dr. TSUBOI Tsutomu, Project Leader at NAGOYA ELECTRIC WORKS CO.,LTD., which provides road information equipment in Japan, and Prof. FUKUDA Atsushi of the Department of Transportation Systems Engineering, College of Science and Technology, Nihon University, has been conducting joint research since 2016 with the research group of Prof. Emeritus U.B. Desai of the Indian Institute of Technology Hyderabad (IITH) (former Director of IITH) through Science and Technology Research Partnership for Sustainable Development (SATREPS)<sup>\*3</sup>. In addition, the research results thus far have been utilized for active discussions and exchanges of views in academic conferences in various Indian cities such as Hyderabad and Mumbai.

The joint research has been carried out in Ahmedabad, a city with a population of 6.8 million people located in western India. The urban transportation situation was grasped making full use of big data analysis utilizing the latest sensing technologies. The objective of the project is to realize a low-carbon, low-energy society through encouraging residents to shift from using private automobiles to using public transport such as subways and buses, by decentralizing congestion through transmitting the optimal route information to residents' devices such as smartphones and utilizing control of traffic lights and road information signs.

The project started with monitoring every movement of vehicles and people on major roads in Ahmedabad City, and collecting big data related to traffic flows in the city. In Japan, it is relatively easy to conduct such monitoring via cameras installed on top of telephone poles and other public infrastructure because there are mainly automobiles on the roads. However, in India, it was extremely difficult to get accurate measurements because two-wheelers run in zigzag among automobiles and three-wheeled vehicles and pedestrians move around in a mess at intersections without traffic lights. Therefore, data collection for analysis was conducted through broad overhead



IITH researchers conducting image analysis of intersections in Ahmedabad (Photo: IITH laboratory)

observation of the entire traffic situation by utilizing drones in addition to cameras installed in the city.

In addition to establishing a common method for grasping traffic volume all over India, this project also aims to build a system for effective utilization of mobile devices. Dr. Tsuboi tells us that even if infrastructure development is advanced in areas with high needs based on the traffic data observed through this project, major challenges will still remain in order to reduce CO<sub>2</sub> emissions and improve the environment in India.

"Currently, subway construction is underway in Ahmedabad. Although it is important to improve infrastructure, it is also important to build a system so that local residents actively use the completed public transportation."

Dr. Tsuboi is currently working on developing a transportation information application for mobile devices, which enables users to search for transportation methods in a highly flexible way. Such applications used in Japan generally allow users to search for routes by selecting mobility options such as "walk," "train," and "car." If this application is put to use in India, it would become possible to search for all modes of transportation simultaneously, such as driving a car from one's house to the station, taking a subway to the station closest to one's destination, and then taking a bus to the destination. By combining various transportation methods, the project aims to encourage users to actively use public transportation that will begin operation in the future. Although it will still take time before the railways in Indian cities run like a mesh as in Tokyo, it is expected that the more people use the new public transport, the more likely it will lead to a multi-modal shift of the urban transportation as well as improvement of environmental problems through the reduction of CO<sub>2</sub> emissions.

There are currently about 400 cities in India with populations of over 300,000 to 400,000 people. Furthermore, it is also said that there are already more than 200 cities that need to become smart cities against the backdrop of rapid economic development in recent years. Therefore, a new transportation innovation through this project, which would serve as a compass in India, is much awaited.



A SATREPS workshop held in Ahmedabad City, India (from the right end: Prof. Fukuda, Prof. Emeritus Desai, and Dr. Tsuboi) (Photo: IITH laboratory)

\*1 Sustainable cities or districts, where management (planning, maintenance, administration and operation, etc.) is carried out and total optimization is intended through utilization of new technologies such as ICT in order to address the various issues faced by cities.

\*2 Building an efficient and favorable transportation environment that meets the needs of users through coordination among transportation organizations.

\*3 See the Glossary on page 25.



## Japanese Agricultural Technology Changes Strawberry Production in Burkina Faso

Initiatives by a Japanese farmer to increase strawberries that can be sold

In Burkina Faso, desertification is progressing, and some lands are not suitable for agriculture. Therefore, in order to increase the income of agricultural community residents in the country and promote exports, JICA conducted a development study through the “Project for the Formulation of Master Plan for the Market-Oriented Agriculture” (PAPAOM) from 2013 to 2015, and selected mangos, onions, soy beans, and strawberries as items that can be produced in Burkina Faso. In particular, strawberries have been produced for more than 40 years in the country, and they are as delicious as those produced in strawberry producing countries such as the United States, France, and Australia. Thus, it was found that strawberries are expected to be a potential export article in future. In light of this situation, JICA’s SDGs Business Supporting Survey “Feasibility Survey for Producing High-Quality Strawberry Production Area due to Modernization of Seed Plants and Production Field Equipment” was implemented in 2018.

Mr. KATO Hideaki, President of Excel Agri played a leading role in this feasibility survey. After having worked overseas at a private company, Mr. Kato took over the farm business of his family and produces rice and strawberries in Ichinomiya City, Aichi Prefecture. He went overseas in search of vast agricultural lands starting around 2010, and by making use of his overseas experience, implemented projects to cultivate, distribute, and sell strawberries mainly in Asia. After that, he learned that strawberry cultivation is also conducted in Burkina Faso, and implemented the above-mentioned feasibility survey by JICA. As a result, he is providing support for strawberry cultivation in the neighboring areas of Ouagadougou, the capital of Burkina Faso, by transferring his experience and technology accumulated throughout his years in Japan. Mr. Kato tells us the following about the current situation of local strawberry farmers:

“Farmers in Burkina Faso cultivate strawberries, but do not sell their products by themselves. They entrust the harvest and sale of their strawberries to the women of the community known as ‘market mummies,’ and receive a part of the sales after deducting the commission. Mammies would sell the gathered strawberries at stalls or to restaurants. However, because the harvesting is done manually and with a limited number of people, a large amount of the strawberries were left in the fields and approximately 70% of them were wasted.”

The reason the strawberry farmers in Burkina Faso do not sell their strawberries by themselves, besides the presence of the traditional market mummies, is because they do not have the techniques and tools to conduct organized harvesting, and that they cannot acquire the necessary tools and equipment such as refrigerators to store the harvested strawberries before selling them. In addition, strawberry farmers do not have packing techniques for selling the harvested strawberries, and most of the farmers are not even aware of the existence of markets where their strawberries can be sold. Mr. Kato assures that strawberries produced in Burkina Faso are delicious and



Mr. Kato giving a lecture on packing methods to strawberry farmers in Burkina Faso (Photo: Excel Agri)

capable of being sold as a product due to its quality. According to him, once harvest and sales methods are established, more strawberries would be distributed in the markets, and the income of strawberry farmers would also increase.

Mr. Kato passionately explains the following. “Firstly, by teaching harvesting techniques, I believe it is possible to increase the harvested amount around four times more than now. Also, building a packing factory with refrigerators enables the farmers to sell more strawberries. In Japan, blemished strawberries that are unable to be shipped can be sold after being processed into a puree form. If we build production factories for processing and commercialization of the blemished strawberries in Burkina Faso as well, it will become possible to further reduce wasted strawberries. The local farmers do not do this because they think there is no demand, but I strongly believe that this is not true.”

Actually, strawberries from Burkina Faso are already shipped in small amounts not only within the country, but also to markets in the neighboring countries of Ghana, Côte d’Ivoire, and Senegal. If it becomes possible to increase the amount of salable strawberries by transferring Japanese harvesting techniques and developing facilities such as factories, it is expected that the sales and exportation of the strawberries to neighboring countries will increase and also contribute to the promotion of exports in Burkina Faso.

This initiative is also positively received by the people of Burkina Faso. In November 2018, Mr. Kato had an opportunity to meet with President Kaboré of Burkina Faso during his visit to Japan, and to have the President taste Excel Agri’s strawberries. Moreover, in December of the same year, young officials of the Department of Agricultural Production Development of the Burkina Faso Ministry of Agriculture, Water Resources, Sanitation and Food Security and young leaders from strawberry plantations were invited to Japan, and spent a week visiting and experiencing the strawberry production of Excel Agri. After having experienced strawberry production in Japan, the participants were impressed, and passionately stated, “I want to try packing immediately” and “I definitely want to build a factory.”

Mr. Kato tells us that he too learned a lot through this project. “By cultivating strawberries without tools or fertilizers, etc. in Burkina Faso, I was able to face strawberry cultivation from scratch again. In addition, after witnessing the fact that delicious strawberries can be cultivated even in a severe environment such as that of Burkina Faso, I adopted what I call the ‘Spartan cultivation method,’ which purposely grows strawberries in a severe environment in Japan. We sold the strawberries produced by this method during the Christmas season in 2019, and the strawberries were highly appreciated as being ‘overwhelmingly’ delicious.”

Mr. Kato sees big potential for the future of strawberry production in Burkina Faso, which has also brought positive results to Japanese farming methods.



Local strawberry farmers receiving guidance regarding cultivation methods from Mr. Kato in a strawberry field in Burkina Faso (Photo: Excel Agri)