


Local fishing port

Mitsubishi Electric group & SDGs

Research and Development Activities for the Lives of the BOP Segment

About the Small World Project

An excess of seventy percent of the world population falls within the low-income segment known as the "BOP". The Small World Project was hatched by Mitsubishi Electric's junior researchers, based on the idea that Mitsubishi Electric products and technologies should be utilized to benefit not only certain developed countries, but the communities and lives of people throughout the world.
We will contribute to improving the lives of the world's people by visiting local communities and extracting challenges and approaches to solutions through experience and communication with people in the BOP segment.

A Compact Refrigerator for Selling Fish in Indonesia

On the numerous large and small islands that make up Indonesia, fish from the sea are not only a primary source of food, but their sales are also a source of daily livelihood for many people. However, fish sold under the scorching sun tend to spoil quickly. This causes drops in sales prices or fish left unsold, leading to income instability. There are also health issues such as food poisoning caused by consuming spoiled fish. To address such issues that have been revealed by local investigation, we aim to develop a compact refrigerator as one of the challenges of this project.

SDGs to which we can Contribute*

Goal 1: The compact refrigerator will enable sales of fresh fish over longer hours and to more distant locations. This would lead to more stable/increased income by preventing price drops and reducing the number of unsold fish.

Goal 3: The compact refrigerator will prevent food poisoning caused by consumption of spoiled fish. It would also be useful in delivering vaccines in areas without electricity, and for applications that require temperature control.

※SDGs: Sustainable Development Goals

A Compact Refrigerator for Increasing Incomes from Selling Fish

In order to improve the lives of people in the BOP segment, it is important to increase their income. Toward this end, we will not stop at the development of a compact refrigerator powered by a motorcycle, but will aim to commercialize it by working with local people to establish effective uses and new workstyles that would increase income.

Prototype model of the motorcycle-powered compact refrigerator

Paying Attention to Local Lifestyles

In pursuing the project, we obtained the cooperation of Kopernik, an NGO that boasts a broad local network, to visit various locations in areas without electricity, including villages, homes, schools, clinics and town halls, to conduct interviews and observe daily life. In doing so, our encounters with fishmongers at fishing ports and remote villages led to an awareness of the issues that exist and the idea for solving them.


Selling fish by motorcycle, and a close-up of spoiled fish

While conducting research in far-flung villages, we occasionally saw fishmongers going from house to house on a motorcycle. However, the fish that they merely carried in a bucket had already begun to spoil. From the fishmongers, we learned that the fish readily spoiled due to the heat, and that this forced them to drop their prices and be left with a large number of unsold fish. It was thus difficult for them to maintain a stable income. According to the villagers, we also learned that food poisoning from consuming spoiled fish was a frequent occurrence.

If fish could be kept fresh during transport, it would be possible to sell them over longer hours and to distant villages, and to reduce the number of unsold fish. Based on this awareness and assumption, the project to develop a small, motorcycle-powered refrigerator was begun.

To allow people who have never used a refrigerator to experience the value of refrigeration first-hand, we developed a prototype model powered by a motorcycle, and had the local people test it, to gain an appreciation of its benefits.

The test simultaneously exposed hardware challenges, such as in dealing with the impacts of direct sunlight and squalls during the rainy season, and in achieving stable cooling performance using only the power supplied by a motorcycle battery. To solve this issue, the latest prototype not only delivers enhanced cooling performance, but also minimizes the area exposed to direct sunlight, adopts a shape that allows rainwater to run off naturally, and features other improvements that take into consideration ease of cleaning and carrying. Furthermore, we have contrived a design that would allow the refrigerator to be attached to the motorcycle using tools that could be procured locally.



Transition of the prototype models (first/second/latest prototype)

A meeting with local people who will take part in the test sale using the prototype

Test sales of fish

Working with the Local People

A vital aspect of this initiative is not to merely offer a product, but to work together with local people in figuring out how to increase income. Even if a refrigerator makes it possible to sell fish over longer hours, income will not increase unless there are people who buy these fish. Therefore, we conducted a test sale of fish in the afternoon and evening, and found that many people miss out on buying fish in the morning because they do not notice the fishmonger coming by in the morning.

Increasing the amount of time that fish could be sold not only increased sales, but also allowed fish to be sold at 30% higher prices in urban areas, where refrigerated fish are preferred. Using our prototype and paper models at times, we are conducting our survey while gauging the reaction of the local people and the effectiveness of the product.

Feedback from the Community

	Voices of fishmongers	Voices of people who buy fish
Main views	・Being able to preserve the fish for a long time has allowed me to sell them until evening. In addition, I've been able to sell fish in farther locations than ever before. ・Customers gladly buy refrigerated fish. ・Customers are willing to pay more for refrigerated fish than for the usual fish.	・I'm able to buy fresh fish with confidence. ・I've gotten food poisoning from buying old fish in the past. I make it a point to choose refrigerated fish. ・I sometimes don't notice that the fishmonger has come, and miss out on buying fish. So, I'm glad to be able to buy fresh fish at times other than just the morning.
Future Expectations and Requests	・I think the fish should be cooled a bit more. ・I'm worried about the load on my motorcycle battery, so it would be better if it used less power.	・I wish to buy safe refrigerated fish, even if they are a bit more expensive.

Mr. Oma using the prototype at home

Connecting Two Different Lifestyles with One Design

In addition to developing compact, motorcycle-powered refrigerators for fishmongers, we are also devising models that could be used in living rooms and bedrooms. They are based on the same shape, and will therefore be manufactured using practically the same production facility.

Mounted on a motorcycle that travels under the scorching sun or through sudden squalls, on one hand, and ensconced near the living room sofa in developed countries, on the other. The same design will connect two completely different lifestyles. Doing so would also allow the same production facilities, including dies, to be used, and to significantly reduce the cost per unit by increasing production.

With an aim to create a world where developed countries and developing countries are linked together by the power of design, our challenge of the Small World Project continues.

Living room and bedroom models

Voices from Developers

Interacting with local children

This project has made it to where it is today thanks to the cooperation of the many people we met through research and experimentation in the farming and fishing villages of Indonesia. I am deeply grateful for their warmth and kindness in willingly cooperating with interviews and prototype tests, and above all for their positive and honest desire to improve their current lifestyles.

Aside from this initiative, I believe that there are still many challenges we need to take on for the communities and lifestyles of those in the BOP segment. These include issues related to water, food, energy, healthcare and education. With the Small World Project, I wish to leverage our products and technologies and continue to pursue activities that create new value in people's lives.

Project members from the left :
Masaki Haruna, Daisuke Echizenya, Takashi Matsumoto, Advanced Technology R&D Center

Yoshinori Saikawa, Yoshiki Matsuyama, Takayasu Hashimoto, Industrial Design Center

Voices from Corporate Partners

Toshihiro Nakamura
Co-Founder and CEO of Kopernik, an NPO in the United States

WEB US Non-profit, Kopernik

Kopernik partners with private companies, public agencies and civic organizations to carry out activities that find and promote effective solutions to the challenges faced by people living in the most remote and hard-to-reach parts of the world — the last mile. People selling fish in Indonesia must store and sell the fish they catch at room temperature, which causes freshness to degrade quickly. This is one of the causes of their low income. After carefully observing the work and lifestyles of these fishmongers, we have worked to test motorcycle-mounted refrigerators and incrementally improve our prototypes. As a result, we have begun to glimpse the promise of increased income thanks to longer selling hours and increased prices made possible by being able to preserve the fish for a longer time. We hope you'll join us as we move forward in forging new avenues for sales, constructing new business models and exploring the possibilities of these refrigerators beyond preserving fish.