

After Six Months Suspension Abstracts Published

Glocal Summer School 2019 Tokyo Tech
Final Presentation Abstract

Title: No More Food Loss* *Glocal Prize

Group Name: PiBiBaShRe

Group Member:

Abstract: There are 975 million people in the world suffering from poverty and the lack of food. One side of the world has surplus food, which eventually gets wasted, while the other side of the world is dying from hunger because of poor economic conditions. In natural disasters like earthquakes or floods, cities face severe shortages of food, resulting in an imbalance between demand and supply. The management of food is very critical in these situations. From group work, we offer a possible solution to this problem.

Our solution is to transport surplus food to the people who really need it. Our strategy is mainly divided into two aspects: technology and deregulation of policies to support innovation.

We propose an organizational structure that will designate responsibility for the collection, transport, and delivery of food. The prototype, once developed, can be implemented to manage the global food supply efficiently. Hunger and food loss are both serious and huge problems in the world. Our basic idea is to help each other solve these problems.

Summary: According to the Milan Protocol[1] published by the Barilla Center for Food and Nutrition (BCFN), a research partner in a sustainable development solutions network recognized by the UN[2], there are three paradoxes related to the main food problems to be resolved. The first paradox demonstrates how the food we produce is not distributed in a uniform way, as 795 million people suffer from hunger while 2.1 billion people are obese or overweight. The second paradox is that 40% of the world's resources of cereals are used to feed livestock and fuel vehicles, though they could be used to feed the world's population. The third paradox involves food waste: we waste a third of all food produced in the world, which is four times more than the amount needed to feed all malnourished people in the world. As an example, Japan wastes 6.5 million tons of food per year[3].

There are five ways to resolve the problem of food loss[4]: reduce sources, feed people, feed animals, divert food waste for industrial uses, and use food waste for composting.

Source reduction is one of the basic solutions for any problem related to waste generation. Identifying potential food recovery opportunities to decrease the amount of waste generated and conducting a food waste audit are effective ways to accomplish this objective. Collecting demand and supply data will help determine if some food waste can be reduced by ordering or producing less. Such data will also indicate how much excess food could be sent to food banks or shelters, and how much could be recycled through animal feeding, rendering, or composting[5]. Predictive or forecasting models and the estimation of demand and supply also play very important roles in reducing loss at the source. After utilizing food for feeding, it can be diverted for industrial uses, such as fuel generation, and composting to produce nutrient-rich soil and prevent food from going directly to landfills.

Of all the ways to solve the problem of food loss, our group focused on feeding people with surplus food that could have been wasted. This solution is related to the first paradox cited by BCFN. We considered two situations that create an imbalance in food demand and supply: the post-disaster livelihoods of people and the condition of poor people in underdeveloped or developing countries, especially in rural areas with topographically challenging regions where there is insufficient food for residents and a lack of knowledge about the quality of food. These problems lead to malnourishment, a high mortality rate, starvation, and a decreased quality of life among affected people.

We propose an organizational system through new technology and deregulation. The most important aspect of our proposal is to provide quality food in an efficient way. For this, we categorize food amassed from various collection centers and delivery centers into short and long expiry food. Food will be collected at specific food centers and then separated and packed accordingly using cooling methods to prevent loss during transportation. This can be visualized as transporting blood bags using drones in mountainous regions where delivery time is crucial. Likewise, we propose to adopt drones for transporting packed food items with short expiry dates in case of emergencies and in places that are topographically challenging for the transport of food via roads. Collected food will be received at a delivery center and then distributed to customers. We focus on customer-to-customer delivery to help everyone understand the importance of assisting each other; we also promote an awareness of the importance of healthy food.

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Regarding the technological aspect of our proposal, transportation is a challenge because of the topography of certain destinations. Today, there are various high-tech services that use drones, auto drive, or new kinds of vehicles to transport goods. These advanced technologies in transportation can also be used to transport food[6]. Regarding deregulation, it is important in terms of developing new technologies and collaborating with societies with different social statuses and values. We think that policymakers are the major collaborators between donors and receivers. We strongly oppose strict regulations that hinder the distribution of food to people in need. Policymakers from each side should collaborate and assume appropriate responsibilities for distributing collected surplus food in an effective manner.

Three major challenges were addressed with regard to implementing our strategy for managing surplus food: (i) source recognition, (ii) collection, and (iii) delivery of food.

Regarding source recognition, finding the areas with surplus food or insufficient food is challenging if there is inadequate coordination and communication between societies and collection centers. Consideration must be given to transporting food from its location to a collection center and then to a deficient area. Therefore, we propose to use satellite images and images from drones to determine the extent of a disaster, the number of people affected, food loss (volume) in a disaster area, and the amount of food available (supply). This data can give us statistics about demand and supply that will be very useful for the management of food. New technologies, such as GIS and remote sensing, can be very helpful for overcoming this challenge.

Collection of food is the biggest task since sources are distributed or scattered randomly. We propose the establishment of a well-developed organizational structure to deal with this problem. We will use an online database, phone calls, and text messages to obtain and provide details about the availability of food; people can also check or ask about availability through the proposed organizational structure, which could be crucial for food management during disasters. We recommend using different collection centers and delegating the rights to manage, make decisions, and distribute food to the locals. The collection center should provide equal benefits to all people who are in need.

Delivery is the most difficult issue since food must be delivered before it becomes waste, especially food products with short expiry dates. Here, a well-developed system with available and proper transportation modes plays an important role. Regarding transportation between countries, collection and delivery centers can deal with the situation with good coordination and the use of local transportation. Systems like Uber Eats can be developed.

We believe that implementing this proposal would be effective and efficient; we consider it to be the best approach for feeding people in need, either after a disaster or for people who are in need because of their economic situations or the topographic conditions of their settlements. Further, this approach could foster a balance in the demand and supply of food to some extent globally.

References:

[1] https://www.barillacfn.com/en/dissemination/milan_protocol/

[2] <http://unsdsn.org/>

[3] <https://www.nippon.com/en/features/h00278/mottainai!-japan-wastes-around-6-5-million-tons-of-food-per-year.html>

[4] <https://archive.epa.gov/wastes/conservation/tools/rogo/web/pdf/food-guide.pdf>

[5] http://www.maff.go.jp/j/press/shokusan/kankyoi/190412_40.html

[6] https://www.kantei.go.jp/jp/singi/tiiki/kokusentoc_wg/h29/teian/20171020_shiryuu_t_1.pdf

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Title: Delight Restaurant ** **Innovative Prize
Group Name: J2W
Group Member: [REDACTED]
Abstract: Aging, health issues, and an isolated society have been the major factors preventing people from enjoying food. With aging, a person may experience a decrease in the number of teeth from 32 to possibly 7, and different health issues restrict people to certain foods. Moreover, the pace of development has isolated the entire society and hampered lifestyles and food habits. To address such problems, we developed the concept of a "Delight Restaurant" - a common space for people where they can eat together. It is proposed as a mediator for connecting people. Food would be served with fire, and some ingredients would contain such elements as sodium, calcium, and potassium so that customers can add them and create fireworks. These elements would not only bring color and smiles to people reacting to the fire but also provide nutrition for the body. Additionally, the proposed restaurant would be equipped with technology to enable all groups of people (even those with food restrictions) to enjoy any dish. We aim to use virtual reality and augmented reality mechanisms to match food with customers' needs. We expect that the incorporation of aesthetics and technology will address the problems that have deprived people of enjoying food and their lives.

Title: Robotics and VR assisted eating for elderly using SED
Group Name: Cheetah
Group Member: [REDACTED]
Abstract: The taste, appearance, and odor of food are important factors that regulate food intake. Common eating problems in the elderly include chewing difficulties and poor appetite. These problems can cause malnutrition, which can increase the chances of post-stroke mortality, Alzheimer's disease, and schizophrenia. Another closely related problem is the rising trend in solitary eating among the aging population. Eating alone leads to depression and is a barrier to food preparation and intake. The objective of the invention is to improve sensory cues, namely the sight and smell of food. Another aim of this invention is to remove the barrier of solitary eating because elderly people can enjoy talking with family members and/or friends through a VR system. The invention will also assist with the chewing of food and release elderly people from solitary eating situations. Keywords: sensory enhancement device, solitary eating, sensory cues, VR, robotics.

Title: Humanoid Refrigerator Robot
Group Name: Kaisendon
Group Member: [REDACTED]
Abstract: Some surveys on the needs of the elderly reveal that older adults have expressed the following; "A solitary and silent meal is lonely," "Ingredients cannot be managed," "[It is] hard to swallow," "Food waste is produced and food is used inefficiently," and "Enjoying food is difficult due to health restrictions." To solve such problems, our group proposes an "integrated refrigerator robot." It is a system that combines a refrigerator with a robot, such as a drone (the head) and the refrigerator (the body). When elderly people have a hard time shopping and purchasing food ingredients, drones can be used for delivering, storing, and managing materials that have been transported to this smart refrigerator. There are two merits of our integrated refrigerator robot. First, the freshness of ingredients in the refrigerator is managed by sensors to ensure safety for the elderly. Second, the refrigerator is a humanoid robot designed to relieve the loneliness of the elderly as much as possible.

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Title: Nutrition Point Program
Group Name: TT3
Group Member: [REDACTED]
<p>Abstract: We want to enjoy eating but we have to be careful about calories and nutritional balance. We know that poor nutrition and the consumption of too many calories cause fat bodies and diseases and that modern people are too busy to eat. As a result, modern people tend to depend on instant food that is highly caloric, fast food, and so on. Such a lifestyle leads to an increase in medical costs. We refer to the "Yokohama City Walking Program," which involves use of a pedometer. Points are earned in proportion to the number of steps, and program participants can win gifts (e.g., coupons, a weight meter, a toothbrush), depending on points earned. We propose using a smartphone with this system to manage caloric content and nutritional balance. Thus, people are encouraged to eat balanced meals in order to obtain gifts provided by the government.</p> <p>Two concerns and their countermeasures are as follows:</p> <ul style="list-style-type: none">(1) False reports can be made by others. -> Program participants should use smartphones with the personal authentication function.(2) It cannot be enjoyed by recording meals. -> Our solution is not long-term. <p>We are gradually becoming more familiar with the application through continued use. We can expect to use gifts as incentives for introducing the system, and users are expected to become self-managing in their food habits (without depending on the application).</p>

Title: Insect Dish with Joy
Group Name: DATE
Group Member: [REDACTED]
<p>Abstract: Insects (collectively) as a food source is a promising solution for food shortages resulting from population growth. However, (1) this food source does not look appetizing, (2) there are only a few recipes using insects, and cooking is monotonous, and (3) when using natural insects, several processes such as cleaning, boiling, and freezing are required to protect consumers from infectious diseases. Such actions require intensive labor and financial capital.</p> <p>Our group proposes an innovative and safe insect food production system that will solve the problems mentioned above.</p> <p>Our solution is original, involving distribution of a personal unit of the proposed system to each household in developing countries. Crickets are good candidates to be used as a food source. In our visualized 3D model, each insect house consists of a multilayer breeding box and mixer for growing insects for the production of insect powder at home. Note that if production increases, food from insects will be supplied by a dedicated insect food factory to families who desire it. Since insects are a rich source of protein (i.e., with nutritional value), they are good not only for people in developing countries but also for elderly people living everywhere. Finally, insect powder is easy to eat when mixed with flour.</p>