

## Using Innovative Technology in the Management of Food Waste in Qatar

Dr. Sana Abusin, Fahad Al-Boinin, Noor Al-Emadi

This brief sheds light on Sustainable Development Goal (SDG) 12.3, “responsible consumption and production.” which has an impact on the achievement of all other SDGs. Food loss and waste are prominent phenomena in the Gulf region, where they have registered exceptionally high records. This aggravates the already-existing problems of food availability, water scarcity, adverse environmental impacts, and increased food imports. In addition, the region is suffering from climate change and other climatic conditions that make it difficult to produce food. The goal of this brief is to seek technological help to reduce food loss/waste and achieve food security. Multidisciplinary views and collective efforts are very important in achieving this goal. The Agri-food system stakeholders from Governmental bodies, civil societies, charities, private and public sectors, IT companies, and scholars gathered together in a roundtable discussion (RTD) to discuss the possibility of using the innovative technology of a mobile application functionality by considering the legal, social, health, and humanitarian responsibilities of the application. The outcomes of the RTD are presented in the recommendations section.

Food security in Qatar is one of the research priorities of Qatar University (2021–2025), the Qatar National Vision 2030, and the Food Security Strategy (2018–2025). To achieve food security, some actions need to be carried out, including the reuse of food surpluses by redistributing them to people in need, reducing food loss and waste, and establishing enforcement agencies to protect customers. Food safety and processing are also very important to achieving food security, as these contribute to food loss/waste reduction and the recovery of valuable products. To achieve food security in a sustainable way, it is very important to differentiate between food terms, such as “surplus” and “loss/waste,” and understand their causes. The following section will provide definitions of the most important concepts.

### Food surplus, food loss, and food waste

**Food surplus** is an excess of consumable food that accumulates because of food being

past its date or food items being overbought or overproduced. According to the Food and Agricultural Organization (FAO), **food losses** are “quantities of food that are lost along the food supply chain and do not reach the ultimate consumer.” This loss takes place during the production, transportation, storage, and processing stages. The use of inadequate storage facilities and logistical mishandling during transportation are a few examples of the causes of food loss.

**Food waste** is defined as food that is appropriate for human consumption being discarded or left to spoil in the retail or consumption phases. Food waste occurs when consumers dispose of food waste intentionally without using it or storing it until the expiration date. Around one-third of the world’s food goes to waste, which is equal to 1.3 billion tons of food and an estimated \$1 trillion in costs. A recent United Nations Environmental Program (UNEP) project in Doha revealed that food waste in Doha ranged between 0.7 kg and 1.5 kg per person per day, which contributes to the country’s

solid waste being transported to landfills (UNEP 2021).

## Consequences of food waste and loss

Food is one of the most important drivers of environmental pressure. Decomposed food waste in landfills releases methane gas and carbon dioxide. The former accumulates for a long time, fueling climate change. The release of these gases also causes air pollution and health deterioration, particularly in terms of water and resource use, greenhouse gas emissions (GHGs), pollution, and subsequent habitat change. Air pollution causes serious health problems, such as increased mortality, chronic health conditions, decreased fertility, behavioral problems, and poor mental health.

***Food loss and waste = inefficiency, unsustainably, and inequality of agri-food systems.***

**Figure 1:** The food waste hierarchy, adapted from Papargyropoulou et al. (2014).

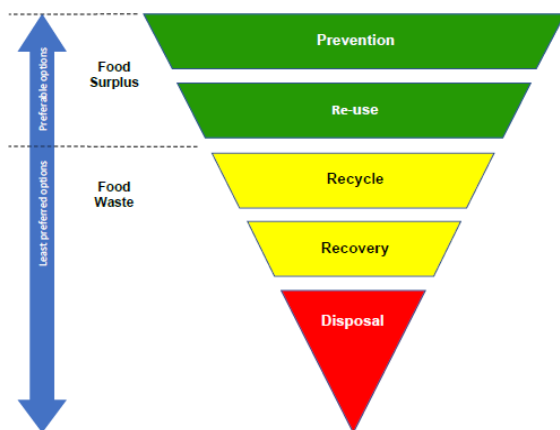


Figure 1 was modified from Papargyropoulou et al. (2014) to be applied to institutional food waste management (e.g., hotels, restaurants, and schools). Green indicates a priority option, while red indicates the least favorable option or the last priority.

There are two priorities to avoid food surpluses: either to prevent overproduction or to redistribute surplus food to people in need. The moment food surplus is considered non-consumable; it automatically becomes food waste. Food waste can be prevented if surplus food is recycled into by-products, such as animal feed, bio-energy to be used in other food sectors like poultry, or aquaculture to feed fish. In addition, it can be used for energy recovery and/or disposal.

In Qatar, there are some initiatives to redistribute food to reduce food loss, such as Hifz el Niema and Wahab, which collect leftover food from hotels, supermarkets, and restaurants and deliver it to people in need. However, not all actors in the food system are engaged in such activities. Thus, emerging technological innovations could help in engaging more entities by bringing together all parties related to food surplus/loss together to alleviate this problem.

Innovation and technology, such as mobile applications, can solve many problems, including environmental and food waste issues. For instance, Maia (2020) analyzed 52 food-sharing platforms and identified three categories of food-sharing platform models: sharing for money, sharing for charity, and sharing for community. The first focuses on Business Consumer transactions to create profits and revenues through surplus food. The second and third focuses on donating food to Non-Governmental Organizations (NGOs) and people in need.

***The use of innovative technology is likely to support sustainability.***

## Existing Agri-food Apps

After browsing the app store for food donation applications and identifying the current food-related applications in Qatar, it was noted that existing applications, such as Talabat and Carriage, only have the option of donating

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fixed or variable amounts to food projects that aim to donate food packages to the needy. Charitable organization applications have a similar functionality, such that they only accept cash donations, which are then used to fund projects to distribute food to others. They do not focus on collecting existing consumable foods and redistributing them to others.

On the other hand, among the agri-food apps outside of Qatar, there are food donation apps that allow users to collect consumable foods and donate them to receiving organizations. These organizations then redistribute the food to people in need. Moreover, receiving organizations and individuals can order the type of food they would like to receive. There are other types of applications that deal with food waste collection and management that only accept non-consumable food to be donated and ordered. The main goal of these food waste management applications is to get food scraps and waste to individuals or organizations that wish to use them for various purposes, such as compost to be used to grow food, because organic fertilizers are both good and safe for indoor parks.

Share **للخير**, our application under consideration, is different from all those mentioned above. It is unique as the first attempt of its kind in Qatar. Moreover, it is not limited to donating and receiving consumable food; it also allows users to donate non-consumable food “waste.”. At a later stage, the application will move toward commercialization by providing services that allow companies to sell compost derived from the food waste they receive. To achieve this goal, the research team organized an RTD with stakeholders in the food sector to discuss the possibility of developing the app.

## Roundtable Discussion

Stakeholders from the agri-food system, including scholars, civil society, charities, private and public sectors, and business companies, came together to discuss the

possibility of developing a mobile application that could help reduce food surplus, loss, and waste in the state of Qatar to support sustainability. The objectives of the RTD were as follows:

1. Understand the current food system and identify food producers or donors.
2. Connect all stakeholders in the sector.
3. Deliver a sustainable solution for food security and food waste in Qatar
4. Encourage cooperation between the public and charitable sectors in this field.
5. Provide integrated production policies that help create sustainable solutions to food insecurity and food waste.
6. Provide sustainable solutions to the problem of food surplus, loss, and waste and come up with useful policies and recommendations. Ministry

## References

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Recommended by FAO Regional Meeting of the Middle East and MENA on Food Security recommended to mainstream food loss/waste reduction strategy, in all policy frameworks that are related to food systems. Accordingly, some policy recommendations and outputs were developed and presented in the following section, to help the future policies.

## Policy Recommendations

1. Encourage farmers to adopt recycling techniques for agricultural waste to extract fertilizer to be used for food production using onsite machines or decomposition methods in their farms.
2. Private-sector companies can contribute to raising awareness regarding food recycling at home and in school by using green bins or renting onsite machines.
3. Charities can develop a distributional map to ensure that food reaches all those in need in Doha equally, with full coverage.
4. Segregated institutional waste can be recycled into compost in coordination with the center of treatment and recycling of the Ministry of Municipality.
5. Government's support and encouragement towards food industries to process agricultural products into by-products, such as jam and tomato paste, especially given the significant increase in local agricultural production, together with imported food.
6. Priority must be given to charities and voluntary organizations in distributing donated food because of their experience in humanitarian work and considering the health and legal responsibilities.
7. Adopt sustainable agricultural technologies, such as artificial intelligence, for food production.
8. Cooperate with the Ministry of Labor to support workers who have lost their jobs or are not receiving their wages for some reason to provide consumable food
9. Business incubators and innovation-promoting entities should cooperate to find entrepreneurs and projects, especially in food recycling, and transformative small industries, which will support the country's economic diversification policy.
10. Provide training opportunities for farm workers and employees to avoid increasing waste, either for logistical or procedural reasons.
11. When developing a strategic framework for the food sector, the government should involve all actors in the food supply chain, as well as NGOs, civil society institutions, and local communities.
12. Concentrate on awareness programs to educate people about the negative impacts of food waste on the environment and human wellbeing.

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