

Ryan Siglag  
Ardsley High School  
Ardsley, NY, USA  
Netherlands, Food Waste

## **The Netherlands: Using Technology to Combat Waste**

### **Introduction**

Located in northwestern Europe, the Netherlands is a small country among some of the most technologically advanced nations. They use technology to address their most pressing issues. One major issue that needs to be addressed, not only in the Netherlands but worldwide, is food insecurity. Several Dutch groups are already using technological methods to fight this issue. If these experts manage to enhance these efforts, the Netherlands could become a role model for the world, demonstrating how to use technology to fight food insecurity.

### **Country**

The Netherlands is a parliamentary representative democracy that occupies a relatively small amount of land—only 16,040 square miles (“Netherlands: Facts & Stats”). The nation has an equal divide between rural and urban populations. Approximately 40% of the population lives in rural areas, 40% lives in urban areas, and the final 20% lives in transitional areas (“Urban Population Outnumbers Rural Population”). The nation has a temperate climate with average temperatures ranging from 35 °F in the winter to 63 °F in the summer with consistent rainfall that averages 31 inches per year (“Netherlands”). The land is covered in over 50,000 farms, of which the average size is 32 hectares (“Netherlands – CAP Strategic Plan”). That is the same area as approximately 800 city blocks. Two-thirds of the land are used for farming with their primary exports including dairy products, eggs, and floricultural products (“Agricultural Trade 2022”).

### **Average Family**

The average size of a household in the Netherlands is 2.18 people (“Average Size of Households in the Netherlands”) and the average household income is 40,722.27 USD (“Netherlands Household Income per Capita”). It is common for people to reside in an apartment or in rows of terraced houses called Rijtjeshuis. Many people obtain their food from local markets that provide them with fresh food. A Dutch diet consists largely of meat, bread, and potatoes (“Practical Advice: Dutch Food Culture”).

Dutch people are fortunate to live under a government that fulfills many of their needs. The Netherlands has a universal healthcare system—it is managed by the government and supplemented by private insurers. All people in the Netherlands are required to have healthcare (Peratello). Furthermore, the nation has a vast infrastructure system that makes the Netherlands both easy to traverse and interconnected with the rest of Europe (“Infrastructure”).

Though the Dutch government provides many services, one issue that has arisen is food insecurity. One barrier to food security are complications with distribution to grocery stores. While the Netherlands' food distribution systems are robust, disruptions in this system can lead to grocery stores lacking food (Bergevoet). Additionally, Dutch peoples' social and physical environments have a large role in food insecurity. Factors such as income, education, smoking status, and religion have been shown to correlate

with food security in the Netherlands (Janssen). These factors can indicate that people are struggling to obtain food or have an over reliance on food with poor nutritional value such as fast food (Janssen).

### **Challenge and Impact**

One primary cause of food insecurity worldwide is the issue of food waste. Food waste occurs in each step of the process of food being grown to its consumption. At the farm, food waste can occur due to problems drying, transporting, or exposing the food to unwanted bacteria, mold, or animals. Food stores can waste food due to equipment malfunction, over-ordering, or the practice of disposing of blemished produce that is perfectly safe and healthy to eat. Finally, consumers waste food when they buy more food than they need and throw out the excess (“USDA: Food Waste Faqs”).

The rampant trend of food waste has several negative impacts. First, it has disastrous effects on the environment. All the greenhouse gas emissions produced as a result of creating wasted food are pointless. In other words, while the emission of greenhouse gasses is an inevitability when producing food, if this food is wasted, harmful emissions are created with no benefit to the world. In fact, 8-10% of all greenhouse gas emissions are tied to wasted products, and it is estimated that reducing food waste could reduce emissions by 4.5 gigatons every year. (Pandit) This pollution is especially harmful in urban areas where it contributes to existing issues of air pollution.

Another detrimental impact of food waste is, of course, its contribution to food insecurity. Each year, one third of all food produced for human consumption is wasted (Pandit). If it were saved, just one quarter of this wasted food would be enough to feed 870 million people (Pandit). In fact, organizations such as Feeding America rescue billions of pounds of food each year for people in need (“USDA: Why Should We Care About Food Waste?”). While this work demonstrates how wasted food can be used to reduce food insecurity, these organizations are only able to rescue just a small fraction of all food that is wasted.

We are not only wasting this food, but also all of the resources and manpower that it took to create this food. These extraneous resources are a financial burden on producers of food. Costs are often passed down the supply chain and lead to an increase in food prices for consumers (Melgar). Thus, it is more difficult for impoverished individuals to afford food.

In first world nations like the Netherlands where excess food is produced, food waste remains prominent. Dutch people waste 8.9% of consumable food each year (Gelder). If the food itself or the resources utilized to produce and transport the food were re-focussed to address food insecurity, the issue of hunger could be greatly reduced. However, as food continues to be wasted in the Netherlands, the needs of those affected by food insecurity are neglected.

### **Solutions and Recommendations**

#### *Autonomous Greenhouses*

One strategy to reduce the waste of resources when growing food is using Artificial Intelligence to control the climate conditions of a greenhouse. Dutch scientists have begun to develop this idea: it is called the AGROS project. They are developing “autonomous greenhouses” where AI monitors and alters characteristics of a greenhouse (Asscheman). Sensors monitor aspects of plants such as water uptake,

light interception, and growth rates in order to make decisions about how the climate conditions of the greenhouse can be altered to improve plant health (Asscheman).

The fact that this technology is being developed is beneficial but for it to have a substantial impact, it must become more widespread. The government of the Netherlands must push for the development of use of this technology. It would be in their interest to provide tax reductions to existing greenhouses for implementing this technology. The benefits of such an act would be plentiful. First, it would be made financially viable for the owners of greenhouses. Government tax breaks should allow them to purchase the required equipment. Once they obtain this equipment, their farming methods would become more efficient, causing their profit margins to increase.

Furthermore, as this technology is being perfected in greenhouses, Dutch scientists should consider applying similar principles to outdoor farming. While it is unfortunately a much less controlled environment, using a similar artificial intelligence model to analyze the efficiency of farming outdoors could lead to major benefits. Doing this could provide insights that help farmers determine how to utilize resources most efficiently. Even if the information provided by the AI data analysis only led to a small positive impact, applying that impact to a large portion of farms could enhance its benefits.

Most crucially, this technology would help reduce the waste that comes with creating food. The AI sensors would allow the greenhouse or farmer to provide the perfect amount of resources for the plant. This not only ensures that extra resources are not being wasted to produce crops but also reduces the risk of plants being malnourished and becoming unfit for human consumption. In other words, greenhouses would not waste excess resources and they would also not waste crops by maintaining the precise conditions they require to thrive. As a result of reduced waste, a greater amount of food is fit for consumption, meaning more will be available for those in need.

The major downside of this plan is the uncertainty of the technology. Since it is still in development, the effectiveness and price of this equipment is open to question. Overall, this is a promising technology that may help the Netherlands address wastefulness in the process of growing food.

### *Reducing Waste in Grocery Stores*

Another AI-driven movement that is already in place in the Netherlands is technology in grocery stores that encourage people to not waste food. A Dutch company called Wasteless has developed a tool to help consumers make smarter decisions in this regard. Their algorithm automatically reduces the price of food as it approaches its expiration date (Morrison). If this practice was government mandated in all Dutch grocery stores it could have incredible results.

People who are in need of food would have much more access to it. A large portion of food in a market is perfectly safe to eat even if it is close to its expiration date. Providing discounts on this food allows people who may have difficulties affording food to obtain groceries for their families. Rather than let the food spoil, the people who need it most are able to purchase it. Even consumers who do not have issues affording food may benefit from the lower prices. Also, the businesses sell more of their inventory. Finally, by reducing food waste, this system reduces the emissions it takes to feed a town which is great for the environment. This is a key example of how reducing food waste helps all people.

Moreover, if the price setting algorithm were updated to allot larger price reductions to foods that are more commonly wasted, this solution could become even more effective. For example, if this technology was used in a store and they found that bread was still being wasted at a high rate, the system could dynamically reduce the price of bread by a greater amount as it approached its expiration date.

A potential negative of this technology is the chance a food actually expires before it is sold in this manner. However, this would likely be an uncommon occurrence due to the fact that many foods are safe to eat even after a sell-by-date (“Decoding Food Expiration Dates”). Regardless, perhaps it is better for those in need to have access to food that occasionally needs to be disposed of rather than having limited access to food entirely.

### **Conclusion**

Hunger is an issue that spans many generations. Yet, we are now getting access to technologies that provide novel approaches to addressing this ever present problem. The Netherlands is at the forefront of creating technology to reduce food waste and insecurity. If they continue on this path, they will not only improve the conditions of their nation, but they will also serve as an exemplar to all other nations on how to combat this issue in the modern age.

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