

## **Thesis Project Portfolio**

**Ukraine Food Crisis: Understanding the Impacts of War on the Global Supply Chain and Applying to Future Events**  
(Technical Report)

**Big Portions, Big Profits: The Story of Oversized Portions and Food Waste in the American Restaurant Industry**  
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science  
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree  
Bachelor of Science, School of Engineering

**Alyssa Freedman**

Spring, 2023

Department of Engineering Systems and Environment

## Table of Contents

Sociotechnical Synthesis.....	2
Ukraine Food Crisis: Understanding the Impacts of War on the Global Supply Chain and Applying to Future Events.....	5
Big Portions, Big Profits: The Story of Oversized Portions and Food Waste in the American Restaurant Industry.....	24
Prospectus.....	41

## **Sociotechnical Synthesis**

The Russian invasion of Ukraine impacted global trade and economic networks a year after the COVID-19 pandemic did the same. Among the areas affected are the global food supply and prices, international export controls, energy supply, and the natural environment. The focus of this technical report is to understand the impact that a military invasion has on a major global food exporter and the countries that it supplies. Ramifications of the pandemic, extreme weather, and the energy crisis laid the groundwork for surging food prices, and Russia's invasion of Ukraine exacerbated existing conditions. Since Russia and Ukraine provide such a significant portion of the world's traded grain, the war caused massive disruptions to the global supply chain. Russia's blockade of Ukraine's Black Sea Ports prevented millions of tons of Ukrainian grain from reaching global markets, and Russia's ability to export grain was hindered by sanctions. Many low-income, net-importing countries rely on Russia and Ukraine for the majority of their grain supply. Russia and Ukraine's inability to export grain caused food insecurity to skyrocket in these countries. Many panicked governments across the world implemented export controls, which only added to increasing prices. In addition, Russia's destruction of Ukrainian farmland has hindered farmers' abilities to harvest, which will keep prices high in the years that follow. The war also had tremendous implications for global energy because Russia is a major exporter of oil and natural gas. After the invasion, countries across the globe attempted to pressure Russia economically by reducing or eliminating their consumption of Russian oil and gas. As a result, energy prices also shot up. All of these compounding factors resulting from the war have inflamed food and energy prices, hindered agricultural production, and exacerbated food insecurity. The technical report will use the Russian invasion into Ukraine as a case study, compiling datasets on topics such as changes in global GDP, wheat and edible oil

prices, oil and natural gas exports, and research about Ukraine's crop production and food supply, to understand how potential future military aggression could impact global supply chains.

My STS research paper explores the history of oversized portions and food waste in the American restaurant industry. Giving customers more than they can eat often yields a tremendous amount of food waste. The leftover waste, in turn, contributes to climate change. Food that goes to a landfill will rot and produce methane, a greenhouse gas. Most previous research has focused on how oversized portions have contributed to increased rates of obesity and other food-related health issues. While my paper touches on the public health impacts of oversized portions, it is primarily focused on their relevance to food waste. Specifically, I explore the agricultural policies, cultural trends, and historical events that have given Americans such casual attitudes towards food waste, focusing on plate waste from oversized portions. Serving oversized portions is common in the restaurant industry because larger portions typically yield larger profits. Giving customers double the amount of food allows the restaurant to get away with charging twice as much, while the additional cost to make it may be only cents. This specifically applies to cheap carbohydrate staples like pasta, rice, or french fries. Restaurants will readily serve oversized portions as a means to increase profits with little regard for the food that is wasted and the environmental impacts that result. However, this wasn't always the case. Nutrition studies have found that portion sizes began to increase in the 1970s, increased sharply in the 1980s, and have continued to increase ever since. Knowing that the trend toward increasing portion sizes began in the 1970s, I analyzed relevant cultural and historical events during this time period. I theorize that the "get big or get out" policies created by former Secretary of Agriculture Earl Butz in the 1970s, the resulting increase in processed foods and

marketing strategies to encourage eating more, and the growth of the restaurant industry were major contributors to increasing portion size. At the conclusion of my paper, I discuss strategies for restaurants to mitigate their food waste and propose a study to determine which of these strategies are most effective.