

# Tackling Food Waste: MIT's Cutting-Edge Approach to Enhance Sustainability in Wholesale Markets

In a groundbreaking research initiative, MIT's Mr. Furqan Khalil Syed, along with the guidance of Dr Chris Mejía and Prof. Sara Grobbelaar, has led an innovative project, by primarily partnering with WUWM's markets network, focused on addressing food waste in wholesale markets through a system dynamics approach. The study, undertaken in collaboration with the WUWM, holds immense promise for creating more efficient and sustainable food supply chains.

## ***The Scope of the Challenge***

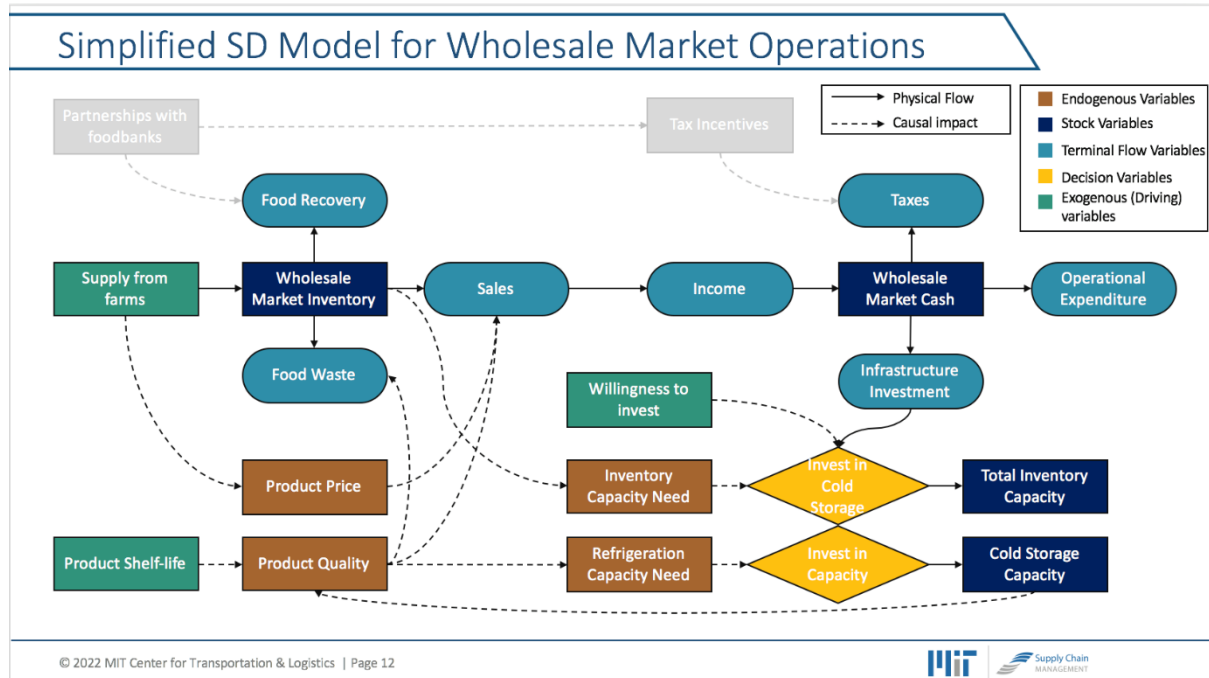
Food waste is a pressing global issue, with one-third of all food produced being lost or wasted (more than 1.3 billion tons of food is wasted every year globally). Simultaneously, 750 million people suffer from severe food insecurity. Thus the question arises naturally; how can we match the dynamic consumption patterns to food sources to ensure accessibility, affordability and availability for all? The research sought to analyze and regulate interactions between stakeholders in the food supply chain to curtail food waste in wholesale markets. By understanding the dynamics influencing waste, the team aimed on the one hand, to recommend targeted interventions that improve affordability and access to nutritious foods and on the other, not to solve specific challenges of specific wholesale markets but devise a framework that can support the process of analyzing issues and developing mitigation schemes.

## ***A Comprehensive Approach***

The MIT research team embarked on a multifaceted approach to tackle the challenge of food waste comprehensively. Through semi-structured interviews with representatives from wholesale markets in six diverse cities worldwide (Barcelona, Spain; Mexico City, Mexico; Paris, France; Hamburg, Germany; Piraeus, Greece; Melbourne, Australia), they identified significant supply chain factors influencing food waste. These factors were classified under five overarching dimensions: Infrastructure, Strategy, Supply Chain Operations, Partnerships, and Macro-Trends.

- **Market Strategy:** The nature of ownership models and strategic orientations of wholesale markets can impact their prioritization of commercial objectives over environmental and social factors. This, in turn, affects the monitoring of food waste and actions taken to address it.
- **Supply Chain Operations:** Operational activities such as transportation, inventory management, and pricing can influence waste generation. For example, improper handling during transport and inadequate infrastructure like cold storage facilities can contribute to food loss.
- **Infrastructure:** Proactive investments in infrastructure, particularly cold storage, can enhance product shelf life and minimize waste. Outdated storage facilities and lack of investment can lead to higher waste rates and costs.
- **Partnerships:** Collaborating with food banks and other redistribution channels can help wholesale markets redistribute excess food and reduce waste. Government incentives through tax schemes can promote such partnerships.
- **Macro-trends:** Economic, political, and social factors can also impact food waste. For example, changing import tariffs can influence sourcing strategies, affecting supply chain dynamics and waste levels.

The research culminated in creating a Causal Loop Diagram (CLD), which provided a holistic representation of the system dynamics. This diagram served as a guide to identifying system archetypes and recurring patterns of behaviour that shed light on critical areas for intervention.



**Key Insights and Simulation Results** The study yielded three significant insights:

1. Major supply chain factors influencing food waste were identified and classified.
2. Two critical systems archetypes were revealed, emphasizing balancing short-term profits with long-term infrastructure investment.
3. High-impact interventions were proposed, including investment in cold storage infrastructure, strategic partnerships with food banks, and the introduction of food processing capabilities.

Through simulations using a Stock and Flow model, the team explored diverse scenarios to understand the market dynamics under various conditions. The "Growing yield with infrastructure investment" scenario demonstrated the importance of proactive infrastructure development to adapt to increasing yields, reduce food loss, and enhance supply chain efficiency.

**The Power of Partnerships and Tailored Strategies**

The study emphasized the significance of partnerships with food banks and charities, which can efficiently repurpose potentially wasted food during periods of fluctuating supply. Furthermore, a tailored approach to managing products with varying shelf lives, such as extending shelf life through processing, was recommended.

**Recommendations for the Future:**

The research underlines the need for consistent waste tracking and strategic, long-term investment to achieve sustainability goals. Proactive infrastructure investment, contingency planning for sudden demand spikes, and innovative processing methods all hold great potential for reducing food waste and increasing profitability over time.

**MIT's System Dynamics Approach: A Catalyst for Change**



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MIT's pioneering research initiative, in collaboration with WUWM, has paved the way for transformative change in wholesale markets. By offering evidence-based insights and targeted interventions, this study equips the industry with the tools to create more sustainable and efficient food ecosystems. The conclusions of the study offer valuable guidance for stakeholders to implement effective strategies and interventions to reduce food waste and enhance operational efficiency in wholesale markets. Future opportunities for research include applying the model in other regions to broaden its generalizability, conducting more in-depth analyses of individual markets, and exploring alternative ways to prevent food waste and create circular supply chains.

As we move forward, the findings of this project will undoubtedly serve as a guiding light for wholesale markets worldwide in their endeavour to curtail food waste, ensure food security, and foster a greener, more sustainable future for all.