

## **I. Introduction**

The Zero-Waste Kitchen is a short, web game designed to raise awareness about the environmental and financial impact of Wasting Food. You step into the role of a household manager tasked with maximising resources and minimising spoilage over a three-day cycle.

The game challenges you across three stages: Smart Shopping (Run to collect ingredients for your kitchen), Meal Planning (using purchased ingredients efficiently), and the Leftover Merge Puzzle (merging the waste food to create new dishes). Your goal is to keep the Waste Score as low as possible, highlighting how conscious choices in the kitchen directly benefit both your wallet and the planet.

## **II. Problem Identification**

Food-wasting is one of the most alarming problems in Vietnam, which leads to the loss of \$4 billion of food each year (Ngô Tùng, 2024). With the rapid pace of modern life and a consumption culture that prioritises convenience, people in Vietnam waste a large amount of food each year, affecting both their financial well-being and the surrounding environment.

Meanwhile, the current problem of famine and poverty is still present in Vietnamese society. Although the living conditions of the Vietnamese have gradually improved over the past decades (News, 2025), the poverty rate in some of Vietnam's mountainous areas are 70% (Minh, 2025).

If we can reduce food waste and allocate these resources to the poor areas, poverty and famine conditions in Vietnam would be less severe, with the financial and environmental well-being being improved as well. Therefore, we see the need to raise awareness about food waste in Vietnam.

### *1. Financial impact*

The most immediate impact of food waste is the direct financial loss to consumers, which is acutely felt by budget-conscious students and young professionals. When food is spoiled due to poor meal planning or improper storage, consumers must spend money again to replace those items. This continuous cycle of buying and discarding can be seen as "throwing money away". The funds spent on wasted ingredients—and the associated energy cost of storing them—could otherwise be allocated toward essential expenses, education, or saving goals, thus hindering financial independence for the younger generation.

Food waste also places an enormous burden on the national economy, rather than just affecting the household budget. A considerable amount of labour, fuel, and ingredients must be spent to produce, collect, transport and distribute the food. Moreover, the local authorities must spend money on the disposal of waste, which money comes from the residents' taxes.

## *2. Environment impact*

The primary environmental concern stems from how organic waste breaks down in landfills. When food waste is buried and decomposes without oxygen (anaerobically), it generates vast quantities of Methane. Methane is a potent greenhouse gas, far more effective at trapping heat than carbon dioxide - approximately 25 times more potent over a 100-year period. Since Vietnam is a country highly vulnerable to the effects of climate change, reducing this avoidable source of powerful greenhouse gas emissions is critical to mitigating future extreme weather events and rising sea levels.

Food production is resource-intensive. When food is wasted, all the resources used to produce it are also wasted. This includes fresh water, which is vital in a country facing increasing scarcity and drought, and land that could have been used more productively. Moreover, poor waste management practices, such as contaminated runoff from overwhelmed landfills (leachate), can seep into and pollute local waterways and soil, threatening local ecosystems and public health. Addressing food waste is, therefore, a foundational step toward promoting water security and responsible resource stewardship in Vietnam.

## *3. Social Impact*

Food waste creates a profound ethical and social disconnect in Vietnamese society. Despite recent economic growth, significant pockets of poverty still exist. Witnessing massive amounts of edible food being discarded - from restaurant kitchens, urban markets, or even household plates - highlights a glaring resource inequity. This practice can undermine the efforts of poverty alleviation and charity work, fostering a perception that resources are limitless among the privileged few while many others still struggle with food insecurity. For young people, being aware of this social contrast compels a necessary reflection on their consumption habits as an act of social responsibility, moving beyond just the financial cost.

# **III. Potential Impact**

The game's design offers a unique way to bridge the gap between knowing about food waste and actually changing habits. By simulating the cost of spoilage over time, the game directly affects players' attitudes towards food waste. This immediate,

quantitative feedback is highly effective for young people, helping them develop crucial micro-management skills often lacking in personal finance education (e.g., inventory tracking, resource allocation, and preventing impulsive buying that leads to waste). The game can serve as a tool to foster conscious consumption, which is highly relevant in Vietnam's fast-growing economy.

As a lightweight, front-end-only web application, the game maximises shareability and accessibility. It can be easily embedded on university student portals, environmental organisation websites, or shared directly via social media campaigns targeting youth. Furthermore, the modular, puzzle-based framework means it can be quickly repurposed to address other local issues relevant to Vietnamese youth- such as the excessive use of single-use plastics or the lack of financial planning knowledge.

In short, this project provides a cost-effective solution and template for education on multiple problems in society, which can be easily modified.

## **IV. Technology Stack**

### *1. Web Resources*

- W3School: provides guides, documents and explanations for HTML, CSS, JavaScript
- Google Scholar: provides scientific evidence, research results to identify the problem.

### *2. AI models*

- Gemini 2.5 Flash: For general code generation, collection of information and generating images
- Copilot Claude Sonnet 3.5: For debugging and fine-tuning of code

### *3. Language*

This website makes the most use of HTML, CSS and JavaScript.

## **V. Game Mechanics**

Of course! Here's a breakdown of your game's mechanics.

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#### ## High-Level Vibe ✨

**\*\*Zero-Waste Kitchen\*\*** is a fast-paced resource management game. The main goal is to run a kitchen for 5 days, cooking as many recipes as possible to earn money while making sure no food goes to waste. It's a mix of quick reflexes and smart planning.

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### ### ## The Daily Grind: How to Play 🎮

Each day in the game is 60 seconds long and is split into two main phases:

#### ##### 🛒 **\*\*Phase 1: Supermarket Run (Action Mini-Game)\*\***

- \* When the day starts, you're immediately in a **\*\*runner mini-game\*\***.
- \* Your character runs automatically, and you press the **\*\*Spacebar to jump\*\***.
- \* The goal is to **\*\*jump and collect ingredient icons\*\*** (like beef, rice, eggs) as they fly across the screen.
- \* You also have to **\*\*dodge obstacles\*\*** (⚠️). Hitting one makes you lose precious time.
- \* This is how you stock your inventory for the day.

#### ##### 🔍 **\*\*Phase 2: Kitchen Hustle (Strategy & Time Management)\*\***

- \* After the supermarket run, you head to the kitchen.
- \* Here, you can see all the **\*\*ingredients you just collected\*\***.
- \* The game shows you a **\*\*list of available recipes\*\*** (like Beef Soup or Fried Rice) and what ingredients they require.

\* If you have the right items, you can **\*\*drag them to one of the three stoves to start cooking\*\***.

\* Each recipe takes a specific amount of real-time to cook. You can have multiple dishes cooking at once if you have enough stoves.

\* When a dish is done, you automatically **\*\*earn money\*\***.

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### ### ## Key Mechanics & Goals

\* **\*\*Don't Waste Food!\*\***: At the end of each day, any ingredients left unused in your inventory are considered **\*\*"wasted."\*\*** This will cost you money and hurt your final score.

\* **\*\*Watch the Clock\*\***: The 60-second timer for the day is always ticking. You have to be quick in both the supermarket and the kitchen.

\* **\*\*Daily Challenges\*\***: To keep things spicy, you get a random challenge each day (e.g., "Cook Fried Rice!"). Completing it gives you a big cash bonus.

\* **\*\*The Win Condition\*\***: The game ends after 5 days. Your final score is based on how much money you made and, most importantly, how little food you wasted.

## VI. Reflection

The core challenge of this project lies in transforming the grim reality of food waste into a game that is both educational and entertaining. In the brainstorming stage, we struggle to find a real-world problem in our area that is not too sensitive but impactful and creative enough.

Moving to the coding stage, with the restriction of creating a front-end WebPage, we find it hard to create a multifunction game that has a high level of completeness. We successfully navigated this by prioritising the educational and informative aspects of the game instead of the graphics. The game uses the real-world prices of the items, making it the most realistic.

The effectiveness of this game lies in its ability to foster social responsibility without relying on guilt or overly complex statistics. By focusing on micro-actions like smart shopping and efficient meal planning, the game addresses the root causes of waste commonly found in student life. This simple narrative framework, combined with the low technical barrier of HTML/CSS/JavaScript, makes the **Zero-Waste Kitchen** a scalable model for tackling other complex societal issues relevant to Vietnamese youth - such as fast fashion habits or basic financial literacy - by making conscious, sustainable decisions a rewarding part of gameplay.

## VII. References

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