SMART 4.0 Online Pitch Competition

Business Plan

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For

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1. Executive Summary

Atup is a start-up business, that provides food waste management solutions to dining halls in developing countries, to address the escalating impacts of food waste on climate change. Research shows the supply chain has the most potential for creating an impact; therefore, dining hall services, such as school cafeterias or buffet restaurants, were chosen as the primary customer. The team identified a lack of competition for food waste management solutions in the developing world and found strong research suggesting there was potential to introduce emerging technology to tackle the problem.

The core services include the following. A SMART bin collects data on discarded food, allowing customers to optimise their kitchen processes based on consumer demand. SMART storage solutions create optimal storage environments to preserve and track food expiration. A mobile application connects customers directly to the products and their consumers and provides key performance metrics to inform them of their food waste management strategies.

The team identified other businesses in this field, including Phood, which addresses mess management primarily in universities; however, Atup has the following competitive advantages:

- Targets the implementation of emerging technology into the developing world
- Offers tailored services to meet the needs of our customers
- Provides a rounded service that customers will value long-term

Regarding the market size, the team identified significant market potential for food waste management in developing countries, particularly in Asia. Additionally identified Atup's segmentation, target, and positioning, after which, Atup will analyse the strengths and weaknesses of the brand and competitors to formulate corresponding marketing strategies.

The finance operations charge $59 USD/year for subscription for services, which will increase to $79 USD/year, by the fifth year of operation. The team expects $1,500,000 USD profit after five years of operation, which will increase 40% in subsequent years. The business will incur around $55-75k USD in initial expenses, for example setting up the mobile application amongst others. The net profit will be $3,900,000 USD.

2. Project Description

The team identified the potential for introducing emerging technology in the developing world to tackle food waste management; therefore, a solution was developed to enhance current processes in dining halls. This service integrates seamlessly into existing processes, provides customers with business intelligence tools and contributes to a circular bio-economy.

This document outlines a business proposal to tackle food waste management.

2.1 Project Background

Food waste is an escalating global problem that significantly impacts climate change throughout the product life cycle. The Food and Agriculture Organisation (FAO) of the United Nations provided the following definition of food waste in 1981, "some wholesome edible material intended for human consumption, arising at any point in the food supply chain that is instead discarded, lost, degraded or consumed by pests". According to the FAO, nearly one-third of all food produced worldwide is discarded or wasted for various reasons [1]. That equates to almost 1.3 billion tons every year. Since the 1980s, Earth has lost a third of arable land to soil degradation, erosion, and pollution, drastically reducing our ability to grow food. The human population is set to increase by more than 35% in the next 30 years, and humanity will need to double global food production by 2050 [2], there is a desperate need to find solutions to reduce, reuse and redistribute food waste.

Discarding food wastes money and produces methane gas in landfills, a greenhouse gas contributing to climate change. Additionally, large quantities of water are wasted from discarding food. According to the World Resources Institute, 24% of all water used for agriculture is lost through food waste yearly, equating to 170 trillion litres [3].

Based on the outlined problem, there is a clear need to find sustainable solutions to alleviate the impact. The team researched the potential for solutions in three main categories: individuals, supply chain and policy [4].

When targeting individuals, one of the best ways to tackle food waste is to manipulate people's choices; for example, not providing a tray at buffet stations disincentivises people to take more food. However, it isn't simple to accommodate the needs of every individual, so more focus is needed to target a collective. Many solutions in this category rely on the individual's motivation, for example, making conscious decisions about regular food intake, understanding labels and composting food.

Policy changes are tedious to implement and get approved; however, they are effective. They typically involve standardising food labels, educating consumers and expanding compost systems. France has banned supermarkets from throwing away or destroying unsold food since 2016. Instead, sellers must donate leftovers to food banks or charities [5]. Similarly, Italy adjusted their health and safety laws to provide more accurate food

expiration dates, in an attempt to avoid good food being thrown away needlessly. One of the best examples where policy has had a significant impact on the food waste problem is in South Korea, where the government banned sending food waste to landfills – easing the pressure on the limited land space [6]. Their "pay as you throw" system puts a monetary value on food waste, which shows people how much they are discarding, so they will be more mindful. While it is difficult to propose a policy change, these solutions inspire other ideas to deal with food waste.

The last category is the supply chain, with immense entrepreneurial potential for process improvement. Current solutions target all areas of the life cycle, from production to the exchange with consumers, which improve access and distribution, extend product life, and incentivise use. These solutions include eliminating promotions, donating excess food and finding alternative means to sell products that don't result in more waste. However, there are fewer solutions to collect data on food waste management, particularly in dining halls, where they provide a daily service to feed a collective. Several solutions exist for this focus; however, the team felt there was enough room for improvement and potential to provide innovative solutions, so this became the business proposal's target.

2.2 Project Proposal

The team's proposal follows a green business model, which enforces a sustainable mindset to develop the products and services. A green business model ensures ample revenue to expand; however, the priority is to create processes with minimal environmental factors, which involves adjusting the service to uphold the business values.

There is a stigma that one person changing their habits has little impact on the greater problem, which is valid to an extent; therefore, this solution targets a collective. Many studies and journals support this statement as there is a need to shift the focus from the person buying to the person selling [7]. Therefore, this proposal tackles the exchange between suppliers and consumers in dining halls (student mess halls, buffet restaurants) to maximise impact and create lasting benefits that fit into current processes.

The Restaurant Food Waste Map (RFWM) was developed from a study into sustainable dining experiences and describes the phases where food waste occurs, as well as mitigation activities [8]. The three phases include kitchen food preparation, food service and clients' consumption. This business proposal acknowledges the outcomes of this study to target aspects of the dining experience which have the most significant potential for improvement.

Modern solutions to this problem feature technology that can prevent, track, and eliminate food waste. These solutions range from methods of preservation, sharing, or enabling waste to be decomposed. Ultimately, solutions that feature technology increase awareness and help the planet. Therefore, the team decided the business proposal must include technology and, if possible, emerging technology to enhance current food waste management strategies.

According to the United States Environmental Protection Agency, countries like the United States waste more food on average than developing nations [9]. However, these countries have a greater capacity for installing solutions, and there is a growing notion that developing countries must learn from the mistakes of developed countries to avoid further escalating the problem of climate change. Therefore, the team decided to address the needs of developing countries as there are opportunities to do real good by tackling food deprivation, influencing future generations, and providing lasting solutions.

In addition, the amount of food waste during production to retailing is consistently large irrespective of geographical factors, as outlined in Figure 1. Therefore, targeting developing countries is appropriate as there is significant potential for addressing food waste problems.

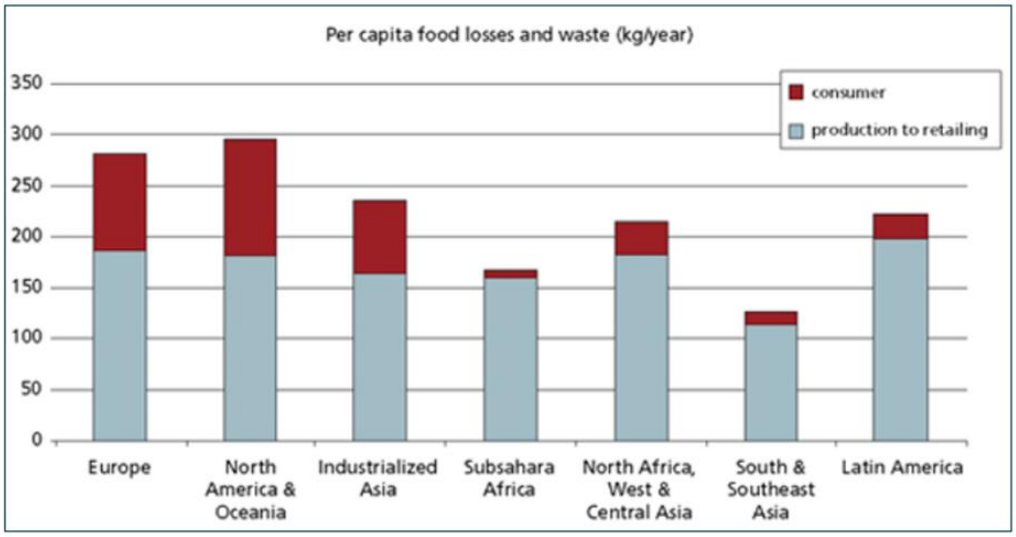

Figure 1: Per capita food losses and waste, at consumption and pre-consumption stages, in different regions [10]

Implementing technology-based solutions in the developing world is challenging as access is sparse, solutions must be low-cost, and knowledge of use is limited. A study investigating food waste management in developing countries highlighted the current status of systems and offered a perspective of future methods [11]. The study suggested smart technology integration can help create sustainable urban food ecosystems (UFEs) for rapidly expanding urban populations in developing countries. New technology featured in UFEs will create entrepreneurial opportunities and more efficiently use resources and people to connect the nexus of food, water, energy, and nutrition. The outcomes of this study justify the use of emerging technology in this business proposal and demonstrate the potential for growth in this market, where it is currently lacking.

2.3 Unique Selling Points

This solution upholds the qualities of a circular bio-economy. The technology solutions collect data on food waste in dining halls, which are used to understand better how much is being discarded and what types are thrown away most frequently. This information can adjust order quantities and propose new dishes to address user demands. Not only will this reduce the amount of food wasted, but it will also provide businesses with considerable

cost-saving potential. Organisations are also encouraged to enact reuse, repurpose and redistribution methods through this service to limit further the amount of food waste going to landfills. This methodology has enormous potential to decrease the resources used to produce food, improve availability for human consumption, help farmers, companies, and consumers save money, and lowers the environmental impact of food production and consumption.

This service addresses consumers' escalating demand of corporate social responsibility (CSR) [12]. The proposal offers organisations opportunities to expand their CSR through managing food waste, connecting like-minded businesses and allowing them to stand out amongst competitors. Additionally, this service aims to become a B-registered corporation to demonstrate commitment to delivering the highest social and environmental performance standards. This certificate will incentivise clients and promote CSR even further.

An article by the United Nations (UN) discusses the potential for technology to avert food waste [13]. This business proposal supports the UN's goal to halve global food waste by 2030, as the article describes how technology solutions have already shown promise in achieving that goal. More technological solutions will become available over time, making it difficult for businesses to keep track of the most effective solutions and incur higher costs. This business proposal provides a service to dining halls whereby they are provided with the most suitable solutions for their work environment. As newer solutions are developed, customers will have the option to upgrade without the hassle of removing and installing equipment, which contributes to the seamless integration of this service into current processes.

As the solution targets developing countries, it must be simple to use, affordable, and have lasting benefits. Businesses may find it difficult to justify the cost of equipment to manage food waste; however, a report into the business case for reducing restaurant food waste suggested for every $1 they invested, they would save on average $7 in operating costs [14]. The team acknowledges the challenges of selling this service to dining halls in the developing world; however, the research proves the potential for growth in this market, highlights the opportunities for cost savings and demonstrates the effectiveness of these solutions to tackle the food waste problem.

2.4 Products and services

The team attended a TED talk by William Chen, who discussed his work on tech innovations to achieve zero food waste processing and a food circular economy. Chen highlighted how simple solutions in the developing world could teach developed countries a lesson; there is a need to put a pause on progress to address the escalating issues we currently face. Advanced technology requires time, resources and highly skilled individuals to implement. Therefore, this service proposes a solution that uses recent technology and simplifies the process to provide access to all.

A key point for this business proposal is it targets a niche in an expanding market. The business provides customers with tools to manage food waste, identify cost savings and increase CSR. As the business grows, it will invest in more advanced technologies and

partner with developers to create more effective solutions to address clients' specific needs, which only this service can accommodate.

Additionally, this business targets the exchange between the supply chain and individuals; therefore, it is necessary to consider the demands of the consumers. An article about food waste from a student's perspective identified the most common reason given for food waste occurring was that the participant did not like the food, which accounted for 29% of occurrences of avoidable food waste, which was closely followed by the kitchen cooking too much and selling it in too large a quantity (Figure 2). This information highlights the critical areas for the products and services to address.

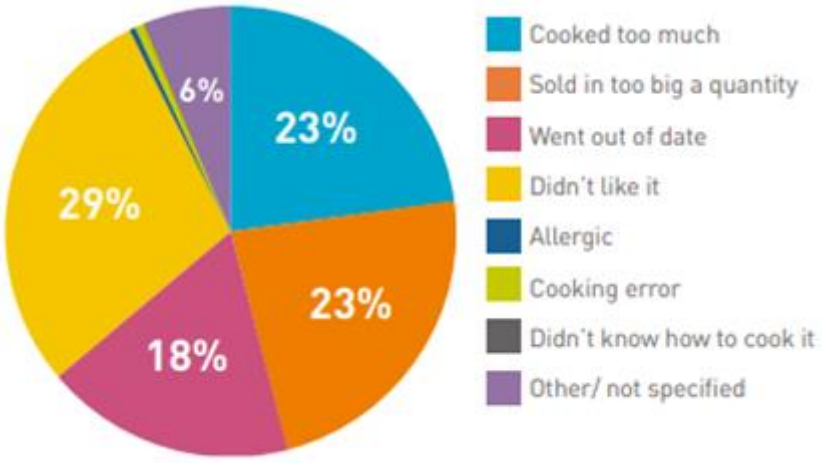

Figure 2: Reasons for food waste, which were avoidable [15]

At a basic level, there are three primary services the business will facilitate: a SMART bin, SMART storage solutions and a mobile application.

2.4.1 SMART Bin

The SMART bin features artificial intelligence (AI) to track how much food is being disposed of, machine learning auto-detects the food type, and an input option for dining hall workers to log reasons for the waste, for example, kitchen error or customer complaint. This information configures deliveries accordingly and strengthens communication amongst dining teams.

This solution provides a leaner approach to understanding food consumption in dining halls. It empowers dining halls with visibility on how their food is wasted, so they can take the necessary steps to reduce it. There are four outcomes from using a SMART bin: optimised production, preserving yield rates, more intelligent purchasing, and menu engineering.

Companies such as Lumitics (Figure 3) or Winnow Solutions (Figure 4) develop SMART bins that meet the needs of this business proposal, as both solutions are durable and effective in their tasks. When Lumitics was starting, they identified two areas for concern: disciplining team members to ensure they don't bypass the system and whether it would hold up during peak hours for restaurants. They found these problems did not impact the device's

performance; instead, they fit seamlessly into current systems. In fact, people were more inclined to use it because it was simple and effective. This quality is essential in this industry, as frontline team members don't have time to figure things out, so it needs to be effortless.

SMART bins can reduce as much as 50% of all food waste generated by a kitchen [16], demonstrating the enormous cost-saving potential for businesses and how these products can significantly reduce the environmental footprint. Lumitics suggests their customers see results within the first few months of implementation and a return on investment (ROI) between 200%-1000% within the first year. Their clients, such as Hyatt, Marina Bay Sands, Singapore Airlines and Etihad Airways, have reduced up to 40% of their food waste, equivalent to more than 200,000 meals [17].

Figure 3: Lumitic SMART bin [16]

Figure 4: Winnow Solutions SMART bin [18]

2.4.2 SMART Storage

SMART storage solutions provide control over storage environments and track food expiration. They are a more reliable tool to store produce than current means, as they are flexible, remove human error in labelling, and maintain different atmospheric levels to optimise the storage environment.

Ovie's Smarterware products are designed to keep track of expiration dates (Figure 5). It uses a database of typical food spoilage times to inform users when their food is about to expire and features a SmartTag, which fits Ovie's container products, that changes colour to reflect the food's condition.

Figure 5: Ovie's Smarterware Container [19]

Additionally, some products control gas levels in storage environments, for example, Bluapple, which absorbs ethylene, the gas responsible for causing produce to ripen quicker (Figure 6).

Figure 6: Bluapple Ethylene Absorber [20]

2.4.3 Mobile Application

The app allows customers to connect directly to the products and their consumers. It is a centralised place for information and provides business intelligence tools to help customers make more informed decisions about food waste management.

The SMART bin displays key performance index (KPI) data that allows customers to adjust their delivery schedules and meal plans depending on how much of what food is discarded.

The SMART storage identifies food about to expire; therefore, the app will provide an intuitive user interface to allow customers to track this information more closely and plan meals accordingly.

In addition, the app can combine both sets of data to develop recommended meals based on the availability of food and the consumers' preferences. Customers looking to enhance their menu could favour a Mediterranean diet in their dining halls, which has been proven to have far less impact on the environment than a meat or pescatarian diet but offers more variety than a vegan or vegetarian diet [21].

Consumers can also view menus and pre-book meals, allowing the kitchen staff to prepare enough food for the number of people dining. This feature will provide further cost savings and allow better time management to control the flow of customers.

2.5 Future Potential

As discussed, it is necessary to keep the technology simple but effective; however, as the demand for this service increases, there will be scope to provide more advanced options in the product line-up.

2.5.1 SMART Bins

Lumitics and Winnow Solutions are relatively new companies, and the technology behind them has only emerged in the last ten years. As they grow, their products are likely to become even more effective, provide more informative tools and cater to their customers' needs. One area for development is possibly auto-sorting the waste into what can be reused, redistributed or repurposed, as described by William Chen in his TED talk. This will have added benefits across the product life cycle as even discarded food can find another purpose, further mitigating the effects of food waste on climate change.

In addition, AI systems will use this information to automate delivery schedules and streamline the feedback loop between what is being wasted and minimising discarded food.

2.5.2 SMART Storage

Recent technological advances provide precise means to store and monitor food, including the electronic nose developed at Nanyang Technological University to detect fresh meatness [22]. These solutions will be expensive; still, customers willing to pay a premium, will see immense benefits.

2.5.3 Mobile Application

The app has the greatest potential for innovation as it is a means to connect users to the products and services. Rob Greenfield's TED talk discusses how much good gets thrown away because it doesn't meet societal standards. The main takeaway of his talk was to donate no dump. It is possible to repurpose food; for example, businesses such as Too Good To Go allow consumers to buy food from restaurants etc., that would otherwise have been thrown away. In a dining hall scenario, this could involve offering an option to collect a second course, incentivising consumers to engage with the service and reducing how much food is wasted.

Additionally, the app could partner with other businesses, such as Too Good To Go or Treatsure, to tackle sourcing and redistribution matters, thus further reducing environmental impact and contributing more to CSR. This would be particularly useful for customers who want to develop more environmentally conscious meal plans. Ugly Food is a business that delivers food directly from the producers and is considered imperfect to sell at supermarkets. Karana is a business that ethically sources jackfruits, one of the world's most sustainably sourced crops, and creates a whole-plant-based alternative to pork, which can be made into ready-to-cook products such as "pork" and chive dumplings and "char siew" buns.

2.5.4 Other

Aside from the basic services outlined in this business proposal, there is potential to expand and address other food waste concerns.

According to a study, Indonesia is the world's second-largest food waster, with every citizen disposing of around 300 kilograms of food every year [23]. Another study reveals that more than 7.5% of the Indonesian population suffers from malnutrition [24]. Food wastage is a global challenge, but it becomes susceptible in a country like Indonesia, where millions of people still fight hunger and live a life of deprivation. Garda Pangan is a Surabaya-based startup and social enterprise addressing this issue with two main objectives: mitigating food wastage and relieving malnutrition. Garda Pangan acquires food from the hospitality industry and serves it to those in need. They have a Standard Operating Procedure (SOP) to determine the quality of procured excess food. The usable portion is distributed to low-income families, while the expired portion is sent to farms where it is processed to make animal feed or compost.

Partnering with companies such as Garda Pungan will support the values of this business proposal and bring forth real change in developing countries.

3. Business Description

3.1 About The Company

Atup targets a niche market of food waste management in developing countries, using SMART solutions. The primary customer is dining hall services in the developing world, such as school cafeterias or buffet restaurants. The team identified a lack of competition for food waste management solutions in this market and found research to suggest there was potential to introduce emerging technology to tackle the problem.

Atup's core values include:

- Availability – our customers operate at varying hours; therefore, our specially trained on-hand team are prepared to assist with any issues.
- Service – our products and services are tailored to the needs' of our customers. We focus on understanding their processes and standards, and operate with total transparency
- Integrity – we endeavour to provide the best service to all customers. We have an opportunity to do real good; therefore, we offer seamless integration of our services to ensure continued use, high quality products to ensure effectiveness, and visibility in our services to provide customers the best solutions for their businesses

3.2 Offering Strategy

Atup provides SMART food waste management solutions to dining halls in the developing world. This service has four main outcomes:

- Upholds the Qualities of a Circular Bio-Economy
    - Data driven solutions allow customers to make more informed decisions about order quantities and meal plans to address user demands.
    - Decreases resources used to produce food, improves availability for human consumption, helps farmers, companies, and consumers save money, and lowers the environmental impact throughout food's life cycle
- Places Emerging Technology at the Forefront
    - Using emerging technology to tackle food waste enhances current strategies, increases awareness and helps the planet
- Addresses the Needs of the Developing World
    - Addresses food deprivation, influences future generations, and provides lasting solutions,
    - Contributes towards sustainable urban food ecosystems (UFEs) for rapidly expanding urban populations in developing countries
- Enables Customers to Optimise their Businesses
    - Contributes towards a businesses' corporate social responsibility (CSR)
    - Significant potential for return on investment, studies show for every $1 businesses invest in food waste solutions, they save on average $7 in operating costs

Atup has a competitive advantage over other food waste management services:

- Targets the implementation of emerging technology into the developing world
- Offers tailored services to meet the needs of our customers
- Provides a rounded service that customers will value long-term

3.3 The Goals

Atup has the following goals:

1. To be the number one provider of SMART food waste management solutions in the developing world
2. To scale the business and invest in more advanced technologies to provide a competitive edge and offer more effective solutions
3. To partner with developers to create tailored solutions the customer's specific needs

3.4 The Team

Our leadership team is collectively exhaustive in terms of expertise and skill required for the field. It comprises Ewan Atkinson, Xinzhi Liu, Vidhi Patidar, Pranavv Haran Nagarajan.

Ewan Atkinson - CEO

A competent and mindful member of the team, who upholds a high work ethic and attention to detail. Responsible for creating a shared vision and providing direction for team functions. He is currently on a study exchange at NTU, Singapore; however, Loughborough University in the UK is his home occupation. His experience leading teams, passion for his work and commitment to building relationships, make him a valued member.

Xinzhi Liu - CMO

Responsible for promoting the company. He worked for NetEase, one of the largest game companies in the world, and was responsible for game marketing for two years. During this period, he was responsible for the online and offline marketing of games with hundreds of millions of users such as Onmyoji and fifth Identity. In addition, he and his roommate started the game video account on bilibili in 2016 and gained a total of 1.4 million followers in two years. Four years of experience in digital and offline marketing has made him proficient in using online and offline marketing channels to find new growth points for the company's products and expand sustainable sales channels.

Vidhi Patidar - CTO

An excellent member with a positive attitude and active listening qualities. She is studying at the top leading technical institute in India. Her passion and dedication to the startup's goals drive her to relentlessly improve the technical components and seek resources for our business idea.

Pranavv Haran Nagarajan - CFO

Responsible for maintaining and calculating the company's revenue and expenses. He has coding and technical expertise, having worked on several projects and attended the Zoho Summer internship, participated in several hackathons and boasts an entrepreneurial mindset, being a the member of entrepreneurship club at SRM university . His teams have won hackathons and placed 4th place on NASA's space app challenge in 2021. He cares for technical clubs at SRM and is currently doing projects with various professors, proving his excellence and creditability at his college. Additionally, he volunteers at NGOs and a few non-profit organisations, having sheltered, and gave 100s of Lost dogs forever homes. His motive is to make India a no stray dog country.

4. Marketing Plan and Strategy

4.1 Industry Overview

The Food Waste Footprint: Impacts on Natural Resources, released on 2013 by FAO and UNEP, provides the analysis of global food waste from an environmental perspective. According to the report, the world's annual production of food that is not eaten uses three times as much water as the Volga River's annual flow, and the production of this food emits 3.3 billion tons of greenhouse gases. The report also noted that grain waste in Asia is a prominent problem, which can significantly impact carbon emissions, water and land use. In addition, rice production is particularly notable for its high methane emissions and significant waste [25]. Because of this, tackling food waste is a growing global problem while giving food waste management products a broad and big market to explore, especially in Asia. Another report from Grand View research, global food waste management accounted for USD 39,547 Million in 2021 and is estimated to achieve a market size of USD 64,025 Million by 2030 growing at a CAGR of 5.7% from 2022 to 2030 [26]. Meanwhile, wasted globally with 53% of food waste coming from Asia, which means more than half of food management's market share is in Asia.

4.2 Market size

4.2.1 Total available market

We used statistical macrodata to calculate the market size of mess management in this section. According to a report conducted by World Wildlife Fund, the United States discards more food than any other country in the world: nearly 40 million tons — 80 billion pounds — every year and estimated U.S. school food waste totals 530,000 tons per year [27]. The food waste on campus accounts for 1.3% of all food waste based on the preliminary calculations. Therefore, we apply this proportion to the global food waste management market size and finally get our global total available market of 514.1 million in 2021. At the same time, according to the global food waste management forecast, this figure will maintain a CAGR of 5.7% annually from 2022 to 2030, reaching a total available market of 8,323 million in 2030.

We quoted data from the world bank and the UIS data for our service sphere, the number of students receiving K12 education in the world was 1.29 billion [28], and another survey by UIS showed that there were 220 million tertiary education students in the world [29]. From a macro perspective, we can at least provide the service to 1.51billion students.

4.2.2 Serviceable available market

As we mentioned on the section of product, we aim to solve the food waste problems in developing countries. We target some developing countries in Asia at the beginning due to dietary habits and cultural reasons, the following countries will be our target markets within five years : Malaysia, Indonesia, Thailand, India, China, Vietnam, Philippines.

According to the survey, the annual food waste in these regions is 343 million tonnes, accounting for 37% of the global food waste (https://blogs.adb.org/blog/repurposing-food-

waste-circular-economy-approach-food-system). Therefore, the market size of food management in these regions can be initially calculated as 14,632 million in 2022, and the market size of mess management for dinning halls will be 190 million in 2022.

4.2.3 Serviceable obtainable market

We plan to launch our products in Malaysia, Indonesia, Thailand, Philippines, and Vietnam in the first and second years and China and India in the third and fourth years. The percentage of food waste of Malaysia, Indonesia, Thailand, the Philippines, and Vietnam accounts for about 23% of the total. As an estimate that we can obtain a 1% share of the regional serviceable available market, so we expect the total market size for the first and second years to be 874,000$. In the third and fourth years, with the expansion of India and China market, our market size can reach 5.06 million.

4.3 Segmentation, Targeting and Positioning

Currently, there are many competitors in the field of food waste management, but they usually cooperate with private enterprises to apply food waste management in different industries. In contrast, We consider that dinning halls in campuses can better apply our AI technology to the problem of food waste, and the feature of these places is that they have a stable and large number of consumers, which can make our products being utilized broadly.

In addition, we found that many companies in the market place their main market in developed countries and most of the competitors focus on solving the Western food waste problem. However, most of the countries with massive food waste are in Asia. On the one hand, due to the food culture, the amount of condiments and side dishes in the food is much larger than that of Western food, causing some unnecessary waste. On the other hand, the huge population and imperfect food infrastructure has made the food waste problem even worse.

Based on the above reasons, our products will focus on the food waste problem of dinning halls in developing countries of Asia and provide them with corresponding food waste management services.

4.4 Competition

4.4.1 Competitor analysis

Table 1: Competitor Analysis

Companies\Pros and cons	Strengths	Weakness	Genres
Winnow	Complete food waste solution Providing accurate data to customers by using emerging technologies, such as AI	Extreme reliance on companies cooperation Low market coverage	Direct competitor

Phood	Data entry of food through AI at the supply-side stage, the data is more precise	Manual sorting of food is required, which is time-consuming and high labor cost	Direct competitor
Lumitics	Using emerging technology to increase food recycling and reutilization, such as 3D printing	Low yield and high cost for food waste	Direct competitor
TABETE	Use push to increase user purchases of expiring products to reduce food waste	Product features are not attractive, and the number of users is small	Indirect competitor
TotalCtrl	Provide users with the most accurate food consumption data through the app, thereby reducing the user's personal food waste	Users need to manually enter food information, which is difficult to operate due to the high threshold for use	Indirect competitor

4.5 Market strategy

4.5.1 Product

There is currently no company on the market that focuses on providing food waste management services based on dinning halls in schools, and we will be the only one. We provide a complete solution for this special Niche. We not only provide sustainable food waste solutions for school canteens , but also allow canteen staff to more accurately understand students' needs through data, to help food and menu iterations and provide data support. In addition, we will emphasize social value and product suitability in the process of cooperation. "Professional mess management service" “Significantly reduce the problem of food waste on campus” can be used as a propaganda point in our subsequent marketing activities, thereby lowering the threshold of consumers' understanding of our products and increasing their trust in the brand.

4.5.2 Price

In order to better develop the market initially, we will give preferential prices to the first batch of consumers who use this product. And launched a bundled preferential price for long-term cooperation, consumers who signed a two-year service will receive the lowest discount. At the same time, to better reflect our price advantage, we need to emphasize the product rate of return in external marketing, that is, the cost savings is several times higher than the product price.

4.5.3 Place

Our sales channels are divided into online and offline:

For online channels, we will start with social media such as linkedin, then through the channels of email and official website for customized selling . The construction of the company's website is very important, we need a website that can display product functions and product advantages. On this website, consumers can browse products, companies,

prices and other related content, and at the same time, they can contact us through this channel for the first time. Compared to phone calls, using email to introduce product features to consumers will not appear to be interrupted busy days. It also allows consumers enough time to browse product information and determine their own needs. In terms of social media, we will prefer to use Linkedin to maintain our relationship with consumers, and push product information at a fixed point in the form of a small number of advertisements, so as to improve the conversion rate of products and brand awareness.

For offline, we will provide consumers with food waste management consulting and product content services in the food waste conferences. The form of conferences will be combined with government department summits on food waste or forums related to educational institutions, so as to reach our consumers more precisely for our brand.

4.5.4 Promotion

As we explained in the segmentation section, our consumers are mainly schools, so our channel will be promoted around school staff. We list the following channels: social media, email, offline presentations.

We hope to use social media channels to increase brand influence and selling volume. LinkedIn will be our main channel, and we will use advertising, influencer marketing and corresponding campaigns to attract target customers and enhance potential users' perception of brands and products.

Email marketing is more accurate and low-cost than social media. We hope to contact relevant technical staff in schools through newsletters and pushy emails. Compared with private enterprises, schools, as educational positions, will have a more positive attitude towards sustainability and food waste. Therefore, we will emphasize the effectiveness of our products to solve food waste in the process of email marketing.

Compared with the other two methods, offline promotion will be more direct and efficient, and we hope to attract consumers through product demonstrations. In order to reach consumers more accurately, we will cooperate with relevant government departments or nonprofit organizations in the future, so that we can have continuous and stable exposure and display opportunities.

4.6 Marketing SWOT analysis

Table 2: SWOT Analysis

SWOT	Content
Strengths	1. Commercial food waste management services 2. Wide customer base 3. Control food waste issues accurately 4. Visualized data and intelligent system
Weakness	1. High equipment costs 2. Rely on campus or governmental cooperation for sellings
Opportunities	1. Less strong competitors in Asia 2. There is currently a lack of food waste management products for Asian food in the market, we can be the first one 3. Mix of Emerging technologies to the mess management, which provides a chance to us to cooperate with corresponding emerging technology companies for marketing and sellings
Threats	1. Over-reliance on campus and governmental cooperation 2. Funding sources are not stable enough

5. Operating Plan

5.1 Quality Targets

The quality targets that our SMART Mess Management system has are as follows:

- Minimize the food wastage in the hostel mess
- Enabling students to skip meals and get a rebate(*Leave the meal* feature to let students leave the meal they are not interested in, or cannot attend, which will then be notified to the mess manager before the meal is cooked.)
- Smart Bins installed in mess for intelligent waste management
- A self-contained system for feedback and suggestions
- A dashboard for mess managers and concerned authorities for posting, updating the mess menus, attendance tracking, monitoring daily leaves and feedback, and pushing notifications directly to the students
- An on-demand notifications system and meal reminders.

5.2 Technical Requirements

The technology requirements for the Mess Management app would be:

- UI/UX designers for designing the app
- Interaction with users: App, people for app building & development
- Analytical support: Expertise in analytical tools, software license for analytical tools
- E-commerce team to handle all the transactions involved
- SMART Bins

5.3 Service Support

Our Mess Management app provides service assistance in identifying the meal they are interested in, skipping the one that doesn't interest them much or has other plans, and getting a rebate amount/incentives if informed beforehand of skipping. And get/give the mess feedback by providing them transparency to look for

6. Financial Plan and Projections

6.1 Income Statement

Revenues	1st year	2nd year	3rd year	4th year	5th year	TOTAL
Smart Bin						
Subscription per year	$ 708.00	$ 4,720.00	$ 10,350.00	$ 18,630.00	$ 25,280.00	$ 59,688.00
installation cost	$ 2,500.00	$ 4,400.00	$ 9,000.00	$ 17,550.00	$ 20,800.00	$ 54,250.00
Service charges	$ 1,750.00	$ 3,600.00	$ 7,500.00	$ 14,850.00	$ 19,200.00	$ 46,900.00
Maintance charges	$ 500.00	$ 1,200.00	$ 2,250.00	$ 4,050.00	$ 4,800.00	$ 12,800.00
transportation charges	$ 720.00	$ 1,200.00	$ 2,250.00	$ 5,400.00	$ 8,320.00	$ 17,890.00
Profit	$ 6,178.00	$ 15,120.00	$ 31,350.00	$ 60,480.00	$ 78,400.00	$ 191,528.00
	1st year	2nd year	3rd year	4th year	5th year	TOTAL
AI Food Labeling						
Subscription per year	$ 708.00	$ 4,720.00	$ 10,350.00	$ 18,630.00	$ 25,280.00	$ 59,688.00
Maintance charges	$ 600.00	$ 1,300.00	$ 2,500.00	$ 4,050.00	$ 4,800.00	$ 13,250.00
transportation charges	$ 720.00	$ 1,200.00	$ 2,250.00	$ 5,400.00	$ 8,320.00	$ 17,890.00
Profit	$ 2,028.00	$ 7,220.00	$ 15,100.00	$ 28,080.00	$ 38,400.00	$ 90,828.00
	1st year	2n year	3rd year	4th year	5th year	TOTAL
Smart Fridge						
Subscription per year	$ 708.00	$ 4,720.00	$ 10,350.00	$ 18,630.00	$ 25,280.00	$ 59,688.00
installation cost	$ 2,500.00	$ 4,400.00	$ 9,000.00	$ 17,550.00	$ 20,800.00	$ 54,250.00
Service charges	$ 1,750.00	$ 3,600.00	$ 7,500.00	$ 14,850.00	$ 19,200.00	$ 46,900.00
Maintance charges	$ 500.00	$ 1,200.00	$ 2,250.00	$ 4,050.00	$ 4,800.00	$ 12,800.00
transportation charges	$ 720.00	$ 1,200.00	$ 2,250.00	$ 5,400.00	$ 8,320.00	$ 17,890.00
Profit	$ 6,178.00	$ 15,120.00	$ 31,350.00	$ 60,480.00	$ 78,400.00	$ 191,528.00
GROSS PROFIT	$ 14,384.00	$ 37,460.00	$ 77,800.00	$ 149,040.00	$ 195,200.00	$ 473,884.00
TAX at 20%	$ 2,860.00	$ 7,492.00	$ 15,560.00	$ 29,808.00	$ 39,040.00	$ 94,760.00
Net Profit	$ 11,524.00	$ 29,968.00	$ 76,240.00	$ 119,232.00	$ 156,160.00	$ 393,124.00

- The finance of our company is based on services that we are providing I.e We are providing **Smart bin** services and **Smart Storage services**
- The Services generates maximum Revenue Based on **Subscription** The based amount of Subscription is **59$**(per month) and the 5th year subscription is **79$** The subscription amount based on the. expenses and the service we provide to make the UI and UX smooth

- The **Subscription** Users at the least number is **12** and the maximum Subscription will be **320.** The Users will be based by the Production of the their company. Which can subsequently changes every year **30 to 40%**

EXPENSES	COST
Employee salary	$ 15,000.00
App and website devlopment	$ 15,000.00
R&D	$ 5,000.00
Marketing	$ 20,000.00
TOTAL	$ 55,000.00

- The major expenses includes Salaries, marketing , App development and website development.
- We focus on marketing leads to get more downloads and Subscription which increases the **Net Profit**

References

[1] "FAO publications catalogue 2021," *FAO publications catalogue 2021*, Apr. 2021, doi: 10.4060/CB4402EN.

[2] "High Level Expert Forum - How to Feed the World in 2050," Rome, Ital, Oct. 2009.

[3] B. Lipinski, C. Hanson, R. Waite, T. Searchinger, and J. Lomax, "Reducing Food Loss and Waste." Apr. 06, 2013. Accessed: Oct. 08, 2022. [Online]. Available: https://www.wri.org/research/reducing-food-loss-and-waste

[4] J. Aschemann-Witzel *et al.*, "Key characteristics and success factors of supply chain initiatives tackling consumer-related food waste – A multiple case study," *J Clean Prod*, vol. 155, pp. 33–45, Jul. 2017, doi: 10.1016/j.jclepro.2016.11.173.

[5] P. Condamine, "France's law for fighting food waste," Nov. 2020.

[6] E. Sim, "The Country With Almost Zero Food Waste," *Lumitics*, Mar. 2020, Accessed: Sep. 25, 2022. [Online]. Available: https://lumitics.com/608-2/

[7] VOX, "Going green shouldn't be this hard," *YouTube*. https://www.youtube.com/watch?v=BxKfpt70rLI (accessed Oct. 08, 2022).

[8] L. Principato, A. di Leo, G. Mattia, and C. A. Pratesi, "The next step in sustainable dining: the restaurant food waste map for the management of food waste," *Italian Journal of Marketing 2021 2021:3*, vol. 2021, no. 3, pp. 189–207, Jul. 2021, doi: 10.1007/S43039-021-00032-X.

[9] "United States 2030 Food Loss and Waste Reduction Goal | US EPA." https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal (accessed Oct. 08, 2022).

[10] Jenny. Gustavsson, Food and Agriculture Organization of the United Nations., and N. ASME/Pacific Rim Technical Conference and Exhibition on Integration and Packaging of MEMS, *Global food losses and food waste: extent, causes and preventionDüsseldorf, Germany*.

[11] N. B. D. Thi, G. Kumar, and C. Y. Lin, "An overview of food waste management in developing countries: Current status and future perspective," *J Environ Manage*, vol. 157, pp. 220–229, Jul. 2015, doi: 10.1016/J.JENVMAN.2015.04.022.

[12] M. Freedman, "Green Business Ideas for Eco-Minded Entrepreneurs - businessnewsdaily.com," 2022. https://www.businessnewsdaily.com/5102-green-business-ideas.html (accessed Oct. 08, 2022).

[13] ITU Hub, "How technology can help avert food waste," Sep. 28, 2021. Accessed: Oct. 08, 2022. [Online]. Available: https://www.itu.int/hub/2021/09/how-technology-can-help-avert-food-waste/

[14] A. Clowes, C. Hanson, and R. Swanell, "THE BUSINESS CASE FOR REDUCING FOOD LOSS AND WASTE: RESTAURANTS," Mar. 2017. [Online]. Available: www.champions123.org/the-business-case-

[15] C. Acheson, "Food Waste: The Student Perspective Why do students waste food, and what can be done about it?"

[16] "Food Waste Solution | Food Waste Management | Lumitics." https://lumitics.com/ (accessed Oct. 08, 2022).

[17] C. Seow Wei, "6 Singapore Entrepreneurs Making The Food Industry More Sustainable," *Tatler*, Jun. 16, 2021. https://www.tatlerasia.com/power-purpose/gen-t/6-singapore-entrepreneurs-making-the-food-industry-more-sustainable (accessed Oct. 08, 2022).

[18] "Winnow | Commercial Food Waste Solutions." https://www.winnowsolutions.com/ (accessed Oct. 08, 2022).

[19] "Ovie Smarterware." https://www.ovie.life/ (accessed Oct. 08, 2022).

[20] "Keep Produce Fresh, Reduce Food Waste, Save Money - Bluapple." https://thebluapple.com/ (accessed Oct. 08, 2022).

[21] Vox, "The diet that helps fight climate change," *YouTube*. https://www.youtube.com/watch?v=nUnJQWO4YJY&t=331s (accessed Oct. 08, 2022).

[22] L. Guo *et al.*, "Portable Food-Freshness Prediction Platform Based on Colorimetric Barcode Combinatorics and Deep Convolutional Neural Networks," *Advanced Materials*, vol. 32, no. 45, Nov. 2020, doi: 10.1002/ADMA.202004805.

[23] "Food Sustainability Index." https://impact.economist.com/projects/foodsustainability/ (accessed Oct. 08, 2022).

[24] D. Bisara, "Indonesia Second Largest Food Waster," Jul. 07, 2017. https://jakartaglobe.id/context/indonesia-second-largest-food-waster (accessed Oct. 08, 2022).

[25] Food and Agriculture Organization of the United Nations. and Food Wastage Footprint (Project), *Food wastage footprint : impacts on natural resources : summary report.* FAO, 2013.

[26] "Food Waste Management Market Size Report, 2020-2027." https://www.grandviewresearch.com/industry-analysis/food-waste-management-market (accessed Oct. 08, 2022).

[27] "Food Waste Warriors | Stories | WWF." https://www.worldwildlife.org/stories/food-waste-warriors (accessed Oct. 08, 2022).

[28] "World Bank Support to Education: : A Systems Approach to Achieve Learning for All." https://www.worldbank.org/en/results/2014/04/28/world-bank-support-to-education-a-systems-approach-to-achieve-learning-for-all (accessed Oct. 08, 2022).

[29] "Global Flow of Tertiary-Level Students | UNESCO UIS." http://uis.unesco.org/en/uis-student-flow (accessed Oct. 08, 2022).