

# A Conceptual Green-Bite Multi-Sided Digital Platform: Enhance Surplus Food Redistribution, Reduce Food Waste and Enhance Food Accessibility

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**Abstract:** This paper proposes a conceptual multi-sided digital platform called GreenBite, designed to solve the problem of food waste while providing food accessibility to B40 communities in Malaysia. The platform connects food and beverage (F&B) businesses with surplus foods to consumers who seek affordable meals with an added donation feature to support the people in need. The platform targets various customer segments including food seekers (consumers), B40 communities, food providers such as restaurants and cafes, donors and sponsors. The study adopts the Design Thinking methodology consisting of Empathize, Define, Ideate, Prototype and Test stages followed by literature review, inspired by existing platforms and user validation through surveys. Findings show that current leading food delivery platforms only emphasize convenience and profit while not focusing on sustainability and social impact. GreenBite introduces a new value proposition by combining surplus food redistribution, real-time availability and donation features which are aligned with environmental and social goals. The proposed business model is validated using Business Model Canvas (BMC), Value Proposition Canvas (VPC), Environment Map and Strategy Canvas which demonstrate its potential to attain the Blue Ocean market space. This study contributes by presenting a digital platform/solution that reduces food waste, enhances affordability and promotes sustainable consumption. Future work includes the development of a full-scale application and detailed business implementation plan.

**Keywords:** Food waste, multi-sided digital platform, surplus food redistribution, B40 community, sustainability, Blue Ocean Strategy.

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## 1. INTRODUCTION

Food waste has become a global issue which has big environmental, economic and social impacts. Globally, a portions of food produced for human consumption are wasted which contributes to inefficiencies in the food supply chain [3]. In Malaysia, this issue is obvious particularly in urban areas where large amounts of foods are thrown out daily by restaurants, cafes and food vendors because of overproduction, strict quality standards and unsold inventory. This causes unnecessary financial losses for businesses, contributes to landfill overflow and increased greenhouse gas emissions, therefore fastening the environmental degradation [14].

On the other hand, Malaysia faces a challenge of food insecurity especially among B40 communities. Many individuals in this income group struggle to afford sufficient and nutritious meals for their family dailies because of the rising cost of living. This highlights a paradox where food surplus and food scarcity coexist. The inability to effectively redistribute surplus food to those in need indicates there is no system or platform that can solve this issue simultaneously.

To understand these issues, it is essential to highlight the primary challenges and expectations of the various customer segments (CS). Food and beverage vendors' most important job to do (JTD) is to keep their inventory organized and

profitable at the same time. Their biggest problems are losing money on unsold inventory. Their biggest benefits are getting back money they lost and meeting their corporate social responsibility (CSR) goals. Moreover, B40 consumers (food buyers) have a JTD which is getting their families healthy meals every day. Their problems are the rising cost of living and food prices while their gains are finding cheap and reliable food sources. People who care (donors) about social issues and businesses that want to help society also want digital ways to do so. Addressing these needs directly supports key national agendas such as the 13th Malaysia Plan (13MP) and Budget 2026 which emphasize socio-economic equity, cost-of-living alleviation and sustainable development. Next, utilizing a digital platform to solve these issues aligns with the MyDigital initiative and the National 4IR Policy which encourage the use of technologies for societal and environmental well-being.

Despite these needs, current solutions in the local and global marketplace are fragmented. The market is currently dominated by conventional digital food delivery platforms which operate on commission-based business models. While their JTBD is delivering food conveniently acting as pain relievers for consumers who is busy and gain creators for restaurants to reach more customers, they usually serve middle to high income brackets and operate on standard retail pricing. They do not have dedicated infrastructures or business models for surplus food redistribution. Besides, NGO-led food banks act as crucial pain relievers for the B40 segment but they operate on non-profit models that often lack sustainable digital scalability and real-time integration.

The main problem with these current solutions is the delivery platforms that are only interested in making money don't consider the B40's need for affordable meals or the surplus food problem that F&B vendors face. Charitable models also don't have the strong digital marketplace mechanics needed to act in real time. Because of this, these current solutions are no longer able to meet the extreme needs and important goals of these different CS at the same time. They also don't fully meet the sustainability goals of the national 4IR and MyDigital agendas.

Creative yet useful solutions are needed. This paper presents GreenBite, a conceptual multi-sided digital platform aimed to prevent food waste and enhance food accessibility in Malaysia. By connecting food vendors, consumers, and donors within a single digital platform, GreenBite enables the redistribution of surplus food at discounted prices while having donation features for the needy communities. Finally, it has built-in sustainability tracking mechanisms, such as carbon footprint reduction metrics to attract socially conscious people while also spreading awareness to all users to be environmentally responsible.

## **2. OBJECTIVES**

The main objective of this paper is to develop a conceptual multi-sided digital business platform (Greenbite) that solves the problems of various customer segments:

- a. To create a fully functioning mobile application for B40 users to easily locate, purchase and collect premium leftovers from local restaurants with much cheaper prices.
- b. To provide a platform for F&B businesses that is trusted and acts as a digital marketplace for them to advertise their food leftovers which subsequently could cover cost, reduce losses and reduce food waste.
- c. To apply sustainable tracking features that calculate how much CO2 footprints have been reduced for every meal sold which uplift environmental awareness to users.
- d. To develop Business Model Canvas (BMC) and Value Proposition Canvas (VPC) that make Greenbite a unique market position based on the Blue Ocean Strategy which proves its survivability and ability to grow compared to other competitors.
- e. To apply software engineering principles in developing it, ensuring user friendly design, smooth and secure transactions and location-based matching for immediate food rescue.

## **3. METHODOLOGY**

This study applied Design Thinking (DT) methodology for developing the GreenBite platform. DT is suitable as it is a human-centred innovation process that focuses on user needs through ideation, visualization and experimentation to solve problems effectively [31]. The process consists of five stages which are Empathize, Define, Ideate, Prototype and Test.

In the Empathize stage, the focus is to understand the needs, challenges and behaviours of key customer segments including food vendors, B40 consumers and potential donors. Data is gathered through academic journals and case studies on food waste, digital platforms and sustainability. Key issues identified are surplus food disposal, vendor financial losses and limited access to affordable food for low-income communities.

In the Define stage, findings from the Empathize phase are analysed to identify the problems which are inefficient in managing surplus food, rising cost of living and the lack of integrated digital platforms to address these sustainability and social impact. These findings are structured into clear and concise problem statements to guide solution development.

The Ideate stage focuses on brainstorming the solutions. This leads to the concept of GreenBite, a multi-sided digital platform featuring a surplus food marketplace, real-time food tracking, affordable pricing, donation features and sustainability tracking. Tools such as the Business Model Canvas (BMC) and Value Proposition Canvas (VPC) are used to define the platform model while Blue Ocean Strategy helps in highlighting its differences from competitors.

During the Prototype stage, a low-fidelity prototype is developed to demonstrate the system functionality and user interactions. Key features are user registration, nearby food search, real-time listings, secure payment, donation options and a sustainability dashboard. Wireframes and mock-ups are created to visualize the user journey.

Finally, in the Test stage, the business model and prototype are being re-evaluated through surveys involving food vendors(providers) and users(consumers). Feedback is analysed for improvements and the business model is refined for better alignment with user needs and market expectations.

## **4. LITERATURE REVIEW**

### **4.1 Food Waste and Sustainability in Malaysia**

Food waste has become environmental and socio-economic issue globally with significant implications for sustainability. Approximately, one-third of all foods produced for human consumptions are lost or wasted every year [3]. In Malaysia, food waste is a growing concern particularly in urban areas whereby the food consumption and disposal rates are high [14].

The increases in food waste contributes directly to environmental degradation because of greenhouse gas emissions, especially carbon dioxide (CO<sub>2</sub>) and methane released from landfills. This contradicting with global sustainability efforts aligned in the United Nations Sustainable Development Goals (SDGs) particularly Goal 12: Responsible Consumption and Production [15].

At the same time, Malaysia faces a paradox where food waste coexists with food insecurity among lower-income groups especially B40 communities. Rising cost of living is making it more difficult for these groups to access affordable and nutritious meals which highlights the need for innovative solutions that solve both waste reduction and food accessibility simultaneously [13].

### **4.2 Digital Platforms and the Sharing Economy**

The digital platforms have transformed conventional business models by enabling the sharing economy whereby resources are utilized more efficiently using technology. Multi-sided platforms connect different user groups such as buyers and sellers while creating values through network effects [7].

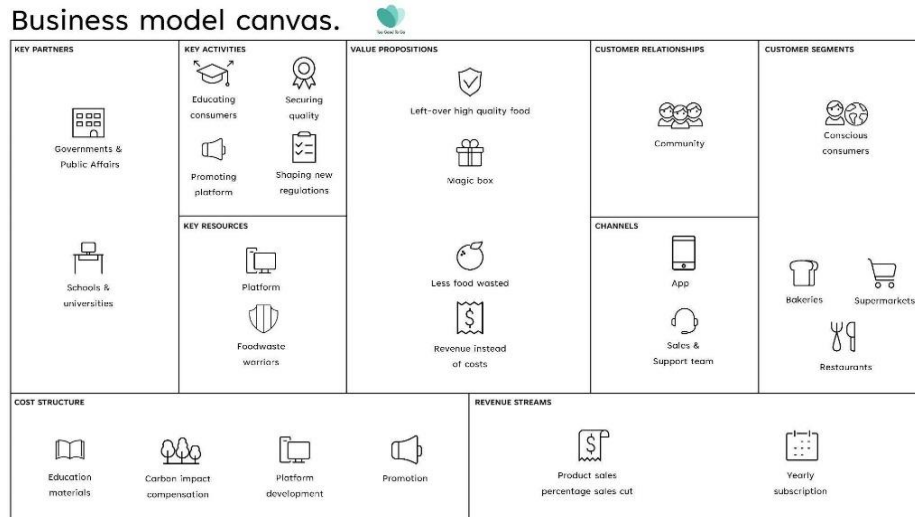
In the context of food services, digital platforms such as GrabFood and Foodpanda leading the food ordering and delivery by providing convenience and accessibility. However, these platforms focus on profit-driven models and don't solve food waste or sustainability issues [10]. In contrast, Feeding India utilize a digital network to redistribute surplus food from restaurants and events to communities which is now successfully providing over 150 million meals [32]. This initiative integrated real-time visibility and donation mechanisms to bridge the gap between food surplus and social welfare thus supporting the UN Sustainable Development Goals.

Research shows that digital platforms play a significant role in reducing inefficiencies in supply chains by enabling real-time matching between supply and demand. This capability makes them particularly suitable for surplus food redistribution where timing and availability are critical factors [4].

### **4.3 Benchmark of Similar Business Models**

#### **4.3.1 Too Good To Go (<https://www.toogoodtogo.com/en-us>)**

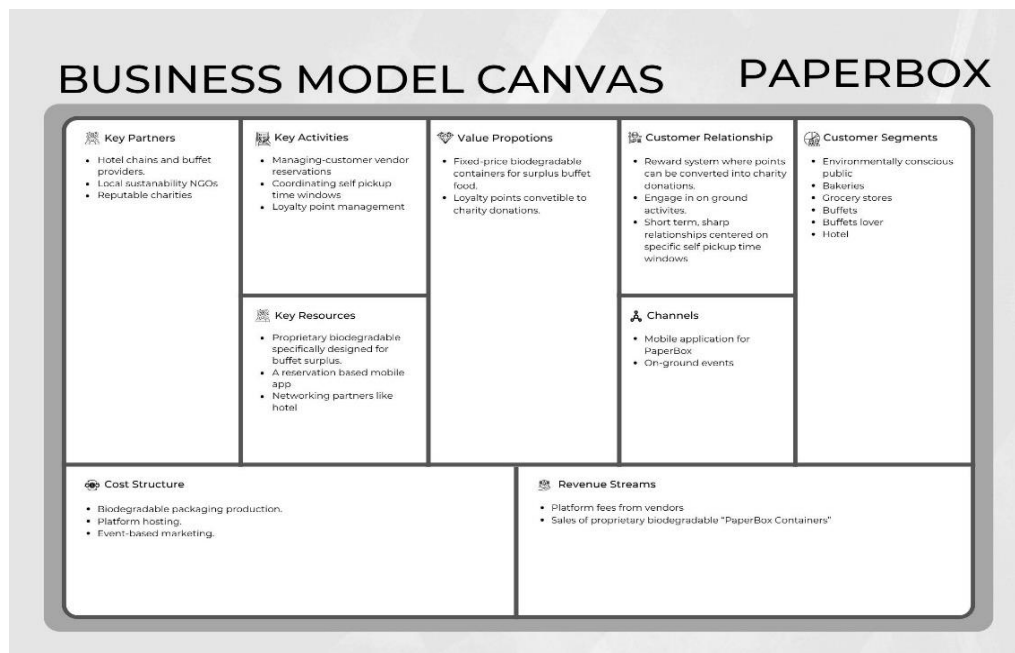
Several companies have introduced innovative solutions to tackle food waste through digital platforms. One notable example is Too Good To Go which allows consumers to purchase surplus food from restaurants at discounted prices. The platform has successfully reduced food waste while offering affordable meals to users [11].



**Fig. 1: BMC Framework of Too Good To Go**

#### 4.3.2 PaperBox (<https://www.ourpaperbox.com/>)

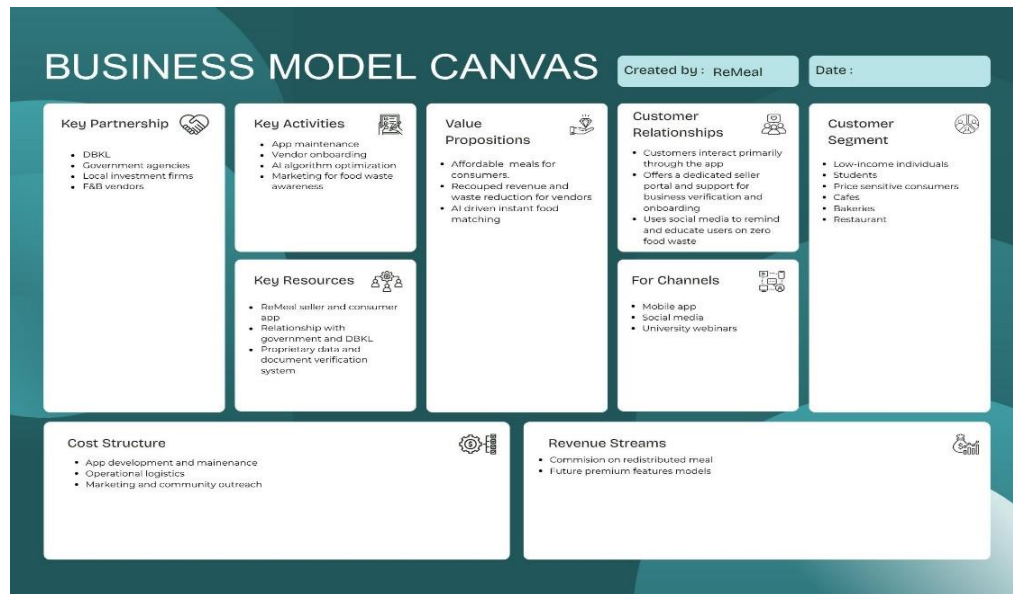
Local initiatives such as Paperbox focus on redistributing excess food through a digital platform that connects food vendors with consumers seeking affordable meals. This platform emphasizes sustainability by reducing food waste while providing lower-cost food options. However, existing literature and platform analysis suggest that Paperbox may lacking in terms of advanced technological features such as real-time inventory tracking and dynamic matching between supply and demand. Additionally, the platform’s functionality may be primarily transactional with less emphasis on integrating broader social impact features such as structured donation mechanisms and sustainability analytics [8].



**Fig. 2: BMC Framework of PaperBox**

#### 4.3.3 ReMeal (<https://remeal.app/>)

Similarly, ReMeal is another initiative that aims to solve food waste by redistributing surplus food to consumers and communities. ReMeal places a strong focus on social impact and sustainability by facilitating access to affordable or rescued food. Despite its contributions, the platform may face challenges related to scalability, user engagement and technological integration. For instance, the absence of comprehensive real-time tracking systems, seamless user experience or integrated donation features may become limiting factors that affect its effectiveness in maximizing both economic and social value creation [9].



**Fig. 3: BMC Framework of ReMeal**

While these platforms demonstrate the idea of surplus food redistribution, gaps remain in terms of scalability, integration of social impact features and user accessibility. These limitations provide opportunities for new solutions such as GreenBite to differentiate itself among these competitors through enhanced functionality and value creations.

#### 4.4 Socio-Economic Challenges of B40 Communities

B40 communities in Malaysia means the bottom 40% of income group, they often face financial constraints and limited access to essential food resources. Economic pressures such as inflation and rising living costs have further increase food insecurity among these populations [1].

Malaysia government initiatives under national frameworks such as Malaysia Digital Economy Blueprint (MyDIGITAL) aim to promote digital transformation and improve quality of life through advanced technology adoption. Additionally, policies aligned with the Twelfth Malaysia Plan emphasize sustainability, social welfare and inclusive economic growth [2].

Despite these efforts, there is still gap in practical and technology-driven solutions that directly address food accessibility for B40 communities. Integrating digital platforms with social impact mechanisms such as donations and subsidies could significantly enhance food security for this group [13].

#### 4.5 Sustainable Business Models and Blue Ocean Strategy

Sustainable Business Models (SBMs) are becoming trends in recent years because they want to create value not only for customers but also for society and the environment. Recent researches emphasize that SBMs integrate economic performance with environmental responsibility and social impact which enable organizations to achieve long-term competitiveness while contributing to sustainability goals [16]. Sustainable business model innovation focuses on redesigning value creation and delivery systems to reduce environmental impact, improve resource efficiency and support responsible consumption practices [17].

In addition, contemporary research highlights that the businesses which adopting sustainability-oriented strategies are more resilient and better positioned in responding to evolving market demands, regulatory requirements and environmental challenges [18]. These models encourage collaboration among stakeholders including customers, suppliers and communities to create sustainable value and improve operational efficiency.

The Blue Ocean Strategy (BOS) is widely recognized as an effective strategic for achieving differentiation and sustainable growth. Recent empirical studies prove that BOS enables organizations to create uncontested market spaces through value innovation, reducing direct competition and unlocking new demand [19]. By focusing on innovation and unique value propositions, the firms can shift from conventional competition-driven markets (red oceans) to newly created markets (blue oceans) thus improving the long-term performance and competitiveness.

In the context of GreenBite, the integration of surplus food redistribution, affordability, sustainability tracking and donation mechanisms represents a unique value proposition aligned with sustainable business model innovation. By addressing environmental issues such as food waste while simultaneously improving food accessibility for B40 communities, GreenBite demonstrates the practical application of both sustainable business model principles and Blue Ocean Strategy. This combination enables the platform to differentiate itself from traditional food delivery services and create a new market space focused on social impact and sustainability.

### 5. INITIAL BUSINESS MODEL (BM) – USING BMC & VPC FRAMEWORK

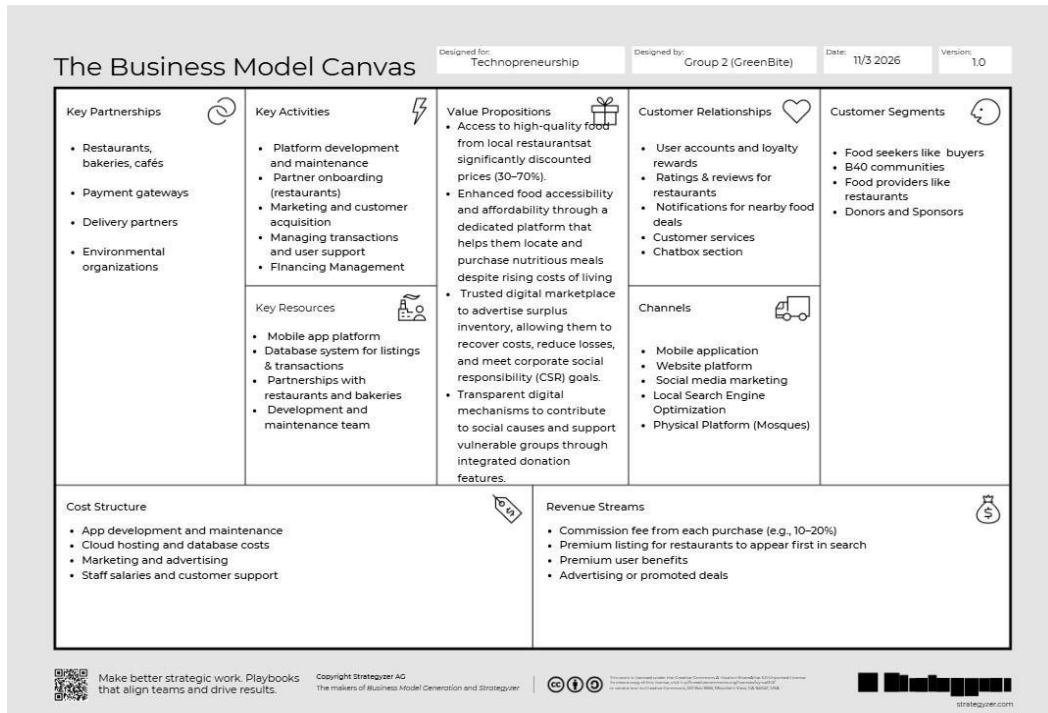


Fig. 4: Initial BMC

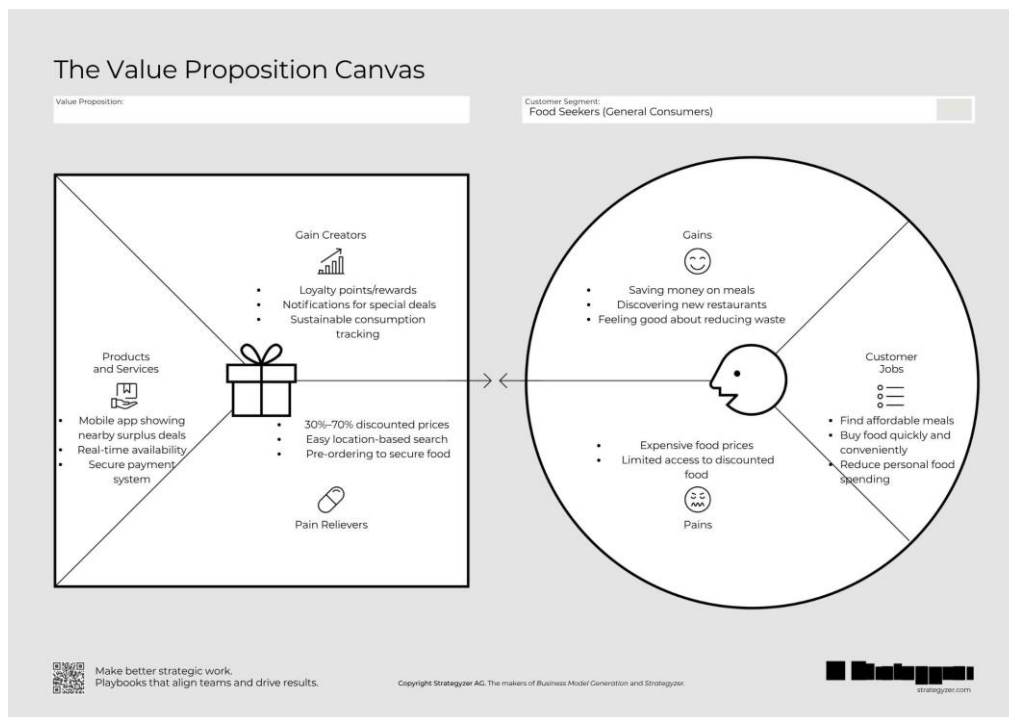
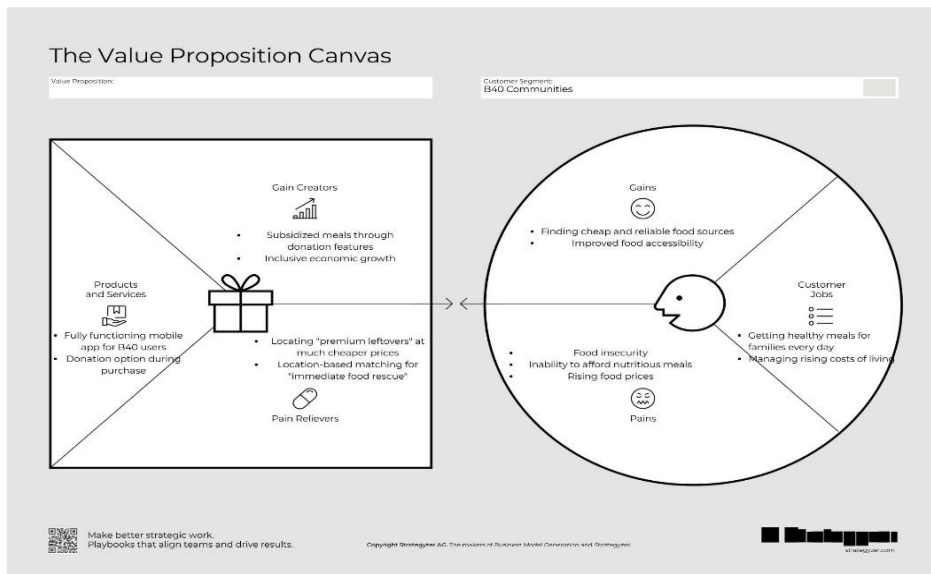
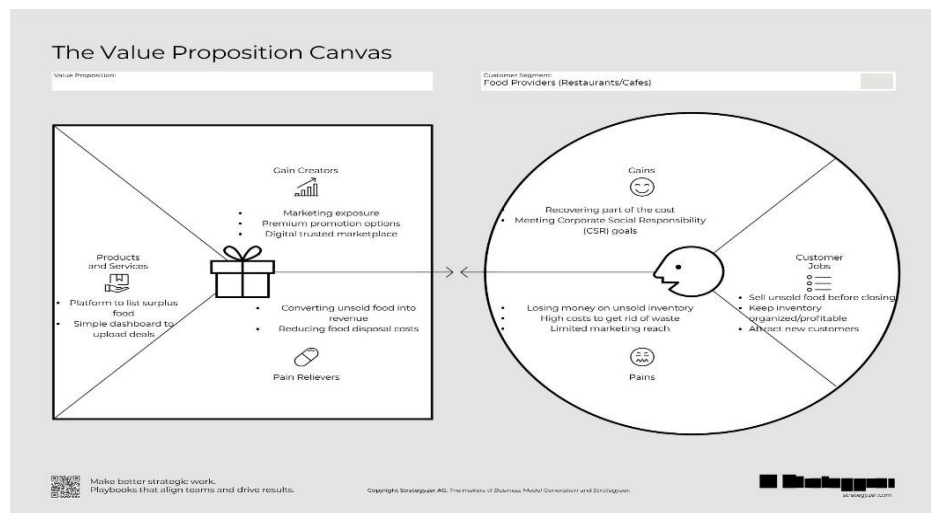


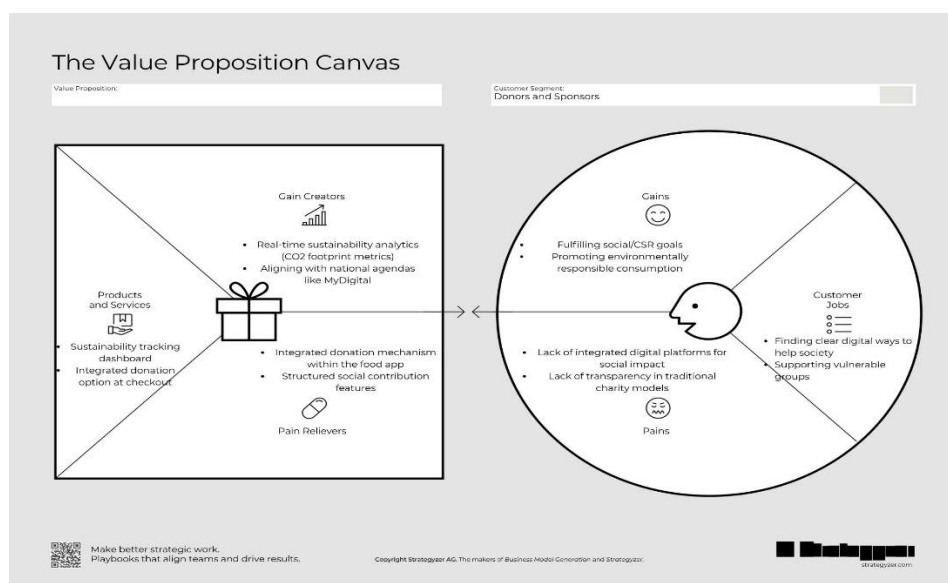
Fig. 5: VPC Diagram for Food Seekers (General Consumers)



**Fig. 6: VPC Diagram for B40 Communities**



**Fig. 7: VPC Diagram for Food Providers (Restaurants/Cafes)**



**Fig. 8: VPC Diagram for Donors and Sponsors**

## 6. VALIDATION OF INITIAL BM – SURVEY RESULT

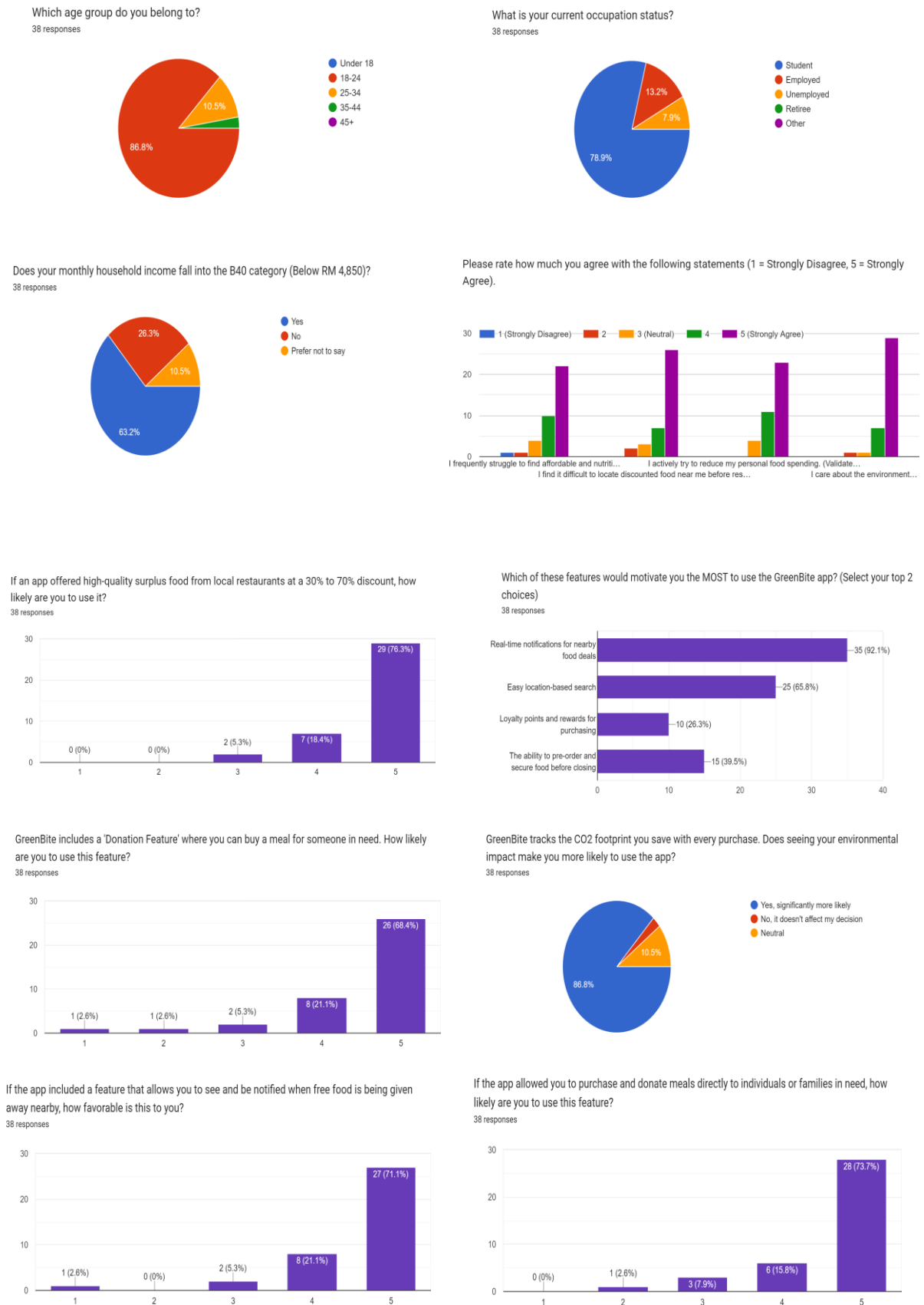
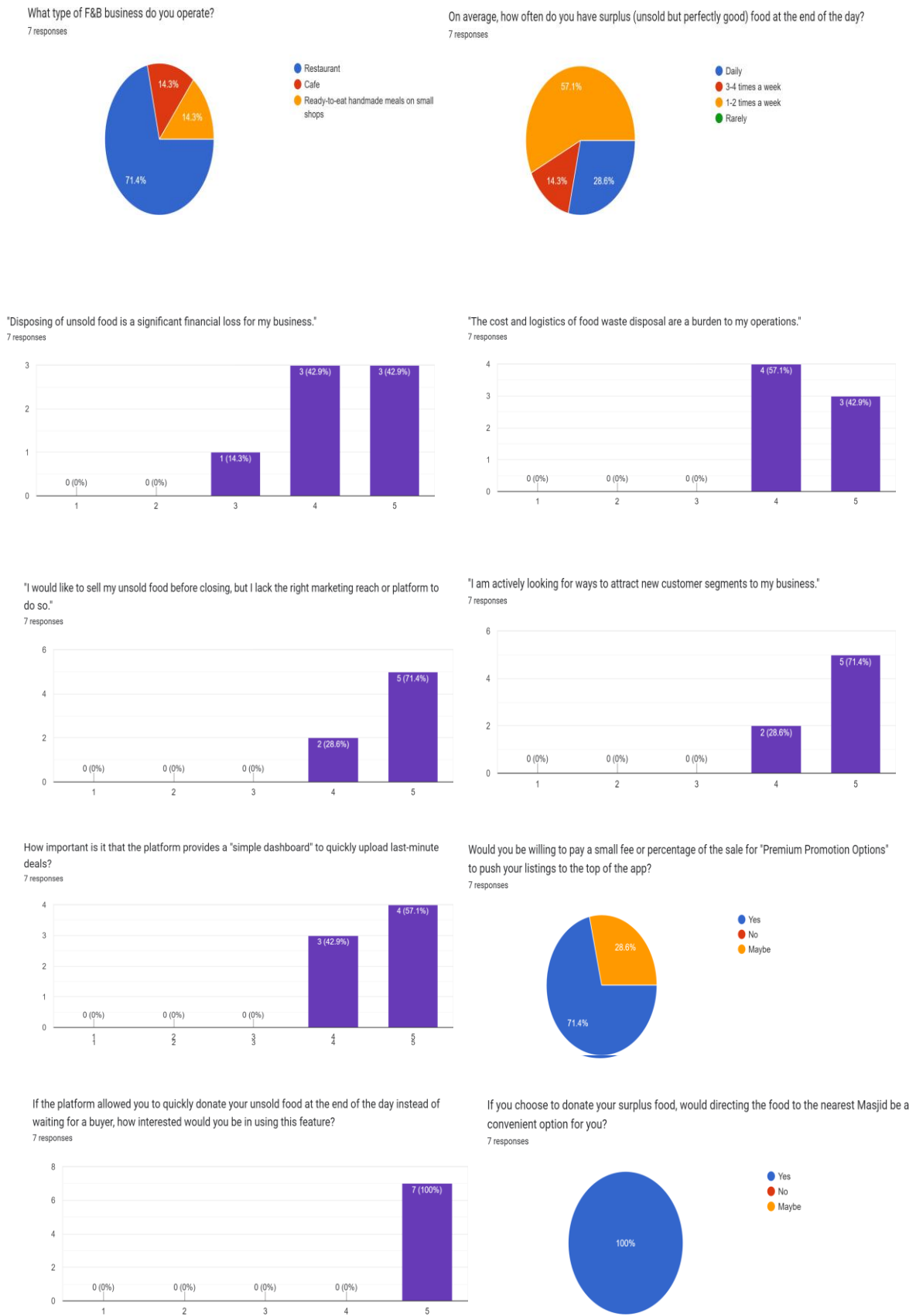


Fig. 9: Dashboard of survey on Greenbite(food buyer)



**Fig. 10: Dashboard of survey on Greenbite (F&B Owner)**

The Greenbite team has conducted surveys for both food sellers (F&B owners) and consumers (focusing on B40 and students). Total of responses that were collected were 45 responses, 7 from F&B owner survey and 38 from food consumer survey.

Based on the responses from the consumer survey, 87.2% aged between 18-24, followed by 10.3% aged 25-34. In terms of occupation, 79.5% of the respondents are students, 10.3% are employed, and 10.3% are unemployed. Most importantly, 64.1% of these respondents are classified as B40.

The result of the survey strongly agrees that this application will be useful and beneficial as 89.7% of the consumers agreed that they find it hard to find affordable food and nutritious daily meals and to locate discounted foods before restaurants close. When we ask for opinions from them on how to solve this problem, 95% of them show high interest in using the application that offers high quality food with discounts ranging from 30% to 70%. The highly requested features to be implemented in the system is "Real-time notifications for nearby food deals" and "Easy location-based search."

On the F&B side, 100% of them are having problems handling their surplus food daily which increases the likelihood of them using an application (100% agreed) that proposes a platform for them to advertise their unsold foods. There are also some of them that would not mind just giving away the food and putting it at the nearest mosque to ease people to take it.

In conclusion, it strongly suggests that the data are aligned with the Value Proposition Canvas (VPC) for B40 consumers, socially conscious users and F&B vendors. The pains of expensive foods and food waste are proved, and the proposed gain creators are highly desired by the market. Thus, Greenbite is highly relevant, aligned with the market needs and is most likely to be successful.

## 7. VALIDATED BUSINESS MODEL

### 7.1 Validated Business Model

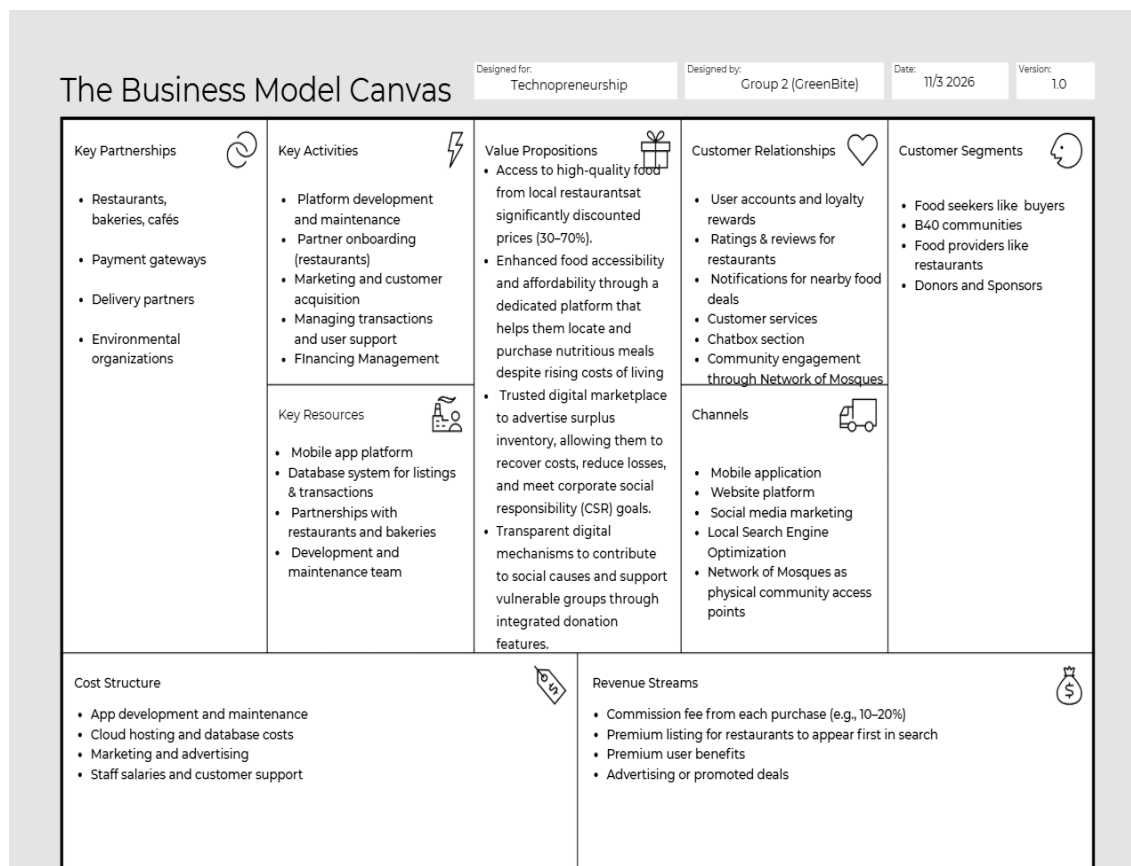


Fig. 11: Validated BMC Diagram

#### i. Customer Segment

GreenBite targets multiple customer segments as a multi-sided platform. These include food seekers such as general consumers and students looking for affordable meals, B40 communities needing low-cost nutritious food, food providers such as restaurants, cafes and bakeries seeking to reduce waste and recover costs as well as donors and sponsors interested in supporting social welfare. Serving these groups creates a balanced value ecosystem.

## **ii. Value Propositions**

GreenBite creates value by addressing the needs of each of customer segments respectively while promoting economic, social and environmental impact.

### **a. Food Seekers (General Consumers)**

GreenBite offers high quality surplus food from local restaurants at discounted prices (30%–70%) which helps users reduce food expenses without worrying about the food quality. Real-time nearby listings improve efficiency while purchasing surplus food supports sustainable consumption.

### **b. B40 Communities**

GreenBite provides affordable nutritious food access to low-income communities. Through discounted food and donation sponsorships, users can receive subsidized meals while maintaining dignity through a specialized digital platform.

### **c. Food Providers (Restaurants)**

GreenBite helps food providers convert surplus food into revenues which also reducing waste and disposal costs. Real-time listings improve inventory management while participation enhances CSR image and community impact.

### **d. Donors and Sponsors**

GreenBite also provides a platform for individuals and organizations to support the food redistribution mission. Donors can track contributions while corporate sponsors gain social impact and brand recognition.

## **iii. Channels**

GreenBite delivers its services through a mobile application and website for food listings, transactions and account access. Social media platforms such as Instagram, TikTok and Facebook support marketing, while SEO improves visibility. Physical outreach through mosques and the Network-of-Mosques helps reach B40 communities for food collection [33],[34],[35].

## **iv. Customer Relationship**

GreenBite builds customer trust and relationships through loyalty rewards, ratings and reviews, real-time notifications, customer support and chatbot assistance. These features improve trust, engagement and user satisfaction.

## **v. Revenue Streams**

GreenBite able to generate revenue through transaction commissions (10%–20%), premium vendor listings, premium user subscriptions and advertising partnerships. These diversified streams support financial sustainability of the platform.

## **vi. Key Resources**

Key resources include the mobile platform, database infrastructure, restaurant partnerships and the development team responsible for development and enhancement of the platform.

## **vii. Key Activities**

Core activities include platform development, system maintenance, partner onboarding, marketing, transaction management and customer support to ensure flawless operations and satisfy the users.

## **vii. Key Partnerships**

Key partners include restaurants, cafes, bakeries, payment gateway providers, delivery services and environmental organizations. These partnerships support food supply, secure transactions, logistics and sustainability efforts.

## **viii. Cost Structure**

Major costs include app development and maintenance, cloud hosting, database management, marketing, staff salaries and customer support. Efficient cost management is essential for long-term sustainability.

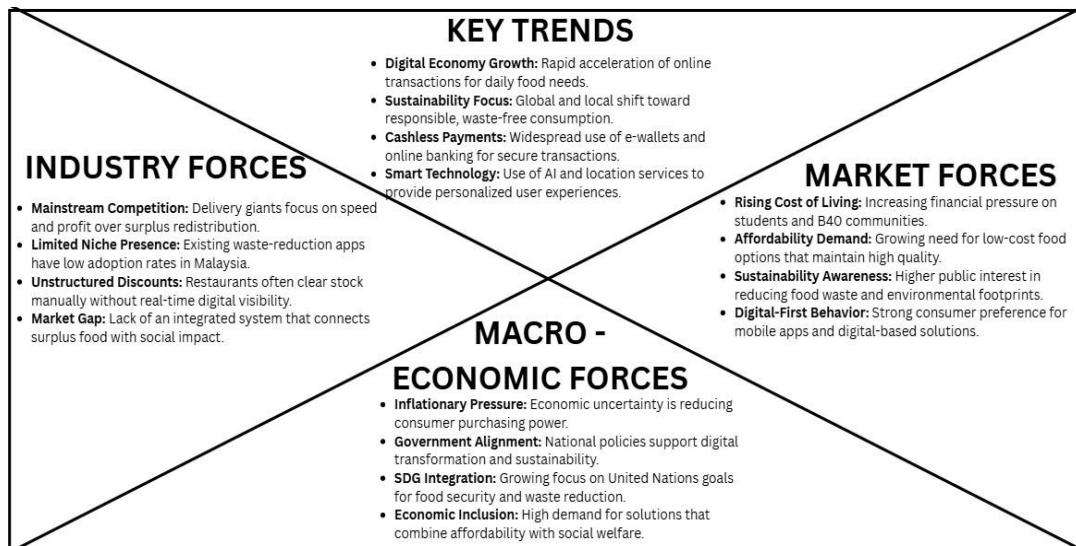


Fig. 12: Environment Map

### Market Forces

Market forces reflect the needs, behaviors and demand of target customers. In Malaysia, there is an increasing demand for affordable meals options particularly among students and B40 communities who are constantly affected by the rising cost of living. Rising prices in foods and household expenditures are putting financial pressure on low-income groups which make the consumers seek more cost-saving alternatives that neglect the food quality [21],[22],[23]. At the same time, public awareness of food waste and sustainability problems has significantly increased thus encouraging more consumers to support responsible consumption practices which are benefiting environments. Studies show that more than 70% of Malaysians are conscious of the impacts of food waste on environmental and economic [24]. Furthermore, the usage of smartphone and mobile applications in daily lives indicates that digital solutions are one of the ways to solve these issues. The smartphone ownership in Malaysia household are reaching over 98% which telling us that mobile-based platforms is an effective and accessible channel for food purchasing and redistribution [21].

### Industry Forces

Industry forces analyzing the competitive landscape and alternative available solution in the current modern market. Existing platforms such as Too Good To Go, ReMeal and PaperBox are currently available within food surplus redistribution ecosystem. However, these platforms focus on convenience, speed and profit rather than social impacts. While Too Good To Go addresses food waste to some extent, its adoption is limited compared to leading delivery platforms in Malaysia. Additionally, many restaurants offer end-of-day discounts to clear unsold inventory which reduces the uniqueness of our discounted food offerings. However, these practices are usually unstructured, lack real-time visibility and absences of digital system which reveal a gap for a more practical and efficient solution like GreenBite. Moreover, industry forces are shaped by the presence of major food delivery platforms and emerging surplus food redistribution services which intensify competition within the market [10].

### Key Trends

Key trends mention technological, social and behavioral changes that may shape the market environment. The rapid growth of the digital economy has increased the adoption of online platforms for everyday transactions including food ordering and payment systems. Consumers increasingly rely on mobile applications for convenience in their routines. At the same time, there is a rising global and local emphasis on environmental sustainability which is becoming driving factor for solutions that reduce waste and promote responsible consumption. Another important trend nowadays is the adoption of cashless payment systems such as e-wallets and online banking which enable seamless, flawless and secure transactions. Key trends indicate a growing emphasis on sustainability and responsible consumption which influencing consumer preferences and business practices [15]. Additionally, the integration of advanced technologies such as artificial intelligence (AI), data analytics and location-based services is becoming more relevance which allows platforms to offer personalized recommendations, real-time matching and satisfying user experiences.

### Macro-Economic Forces

Macro-economic forces refer to wider economic and societal conditions that affect dynamic markets. In Malaysia, the rising cost of living has significantly impacted purchasing power particularly among B40 communities which increase the demand for affordable food solutions. Inflation increases financial challenges which made the cost-efficient alternatives more attractive to consumers. National policies promoting digital growth and development also create an environment to support innovative platforms like GreenBite. These macro-economic conditions highlight relevance of solutions that integrate economic affordability, environmental sustainability and social impact.

### 7.2 Strategy Canvas

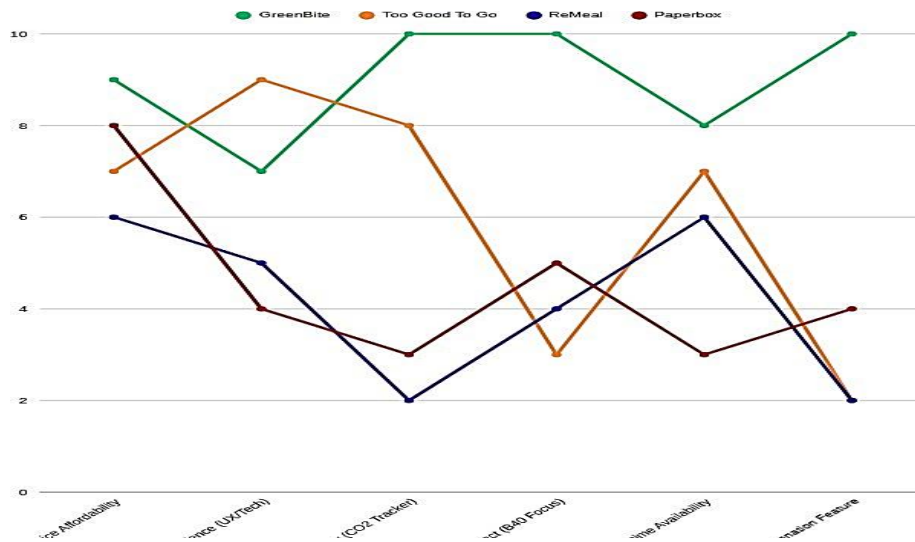


Fig. 13: Strategy Canvas

Strategy Canvas demonstrates the Blue Ocean Strategy application by comparing GreenBite among existing competitors like Too Good To Go, ReMeal and Paperbox. Many competitors focus on basic convenience and price, therefore GreenBite raises the bar on sustainability and real-time availability. Most significantly, it creates a new market space by utilizing factors where other competitors don't have, especially in Social Impact (B40 Focus) and the Donation Feature.

By avoiding a Red Ocean crowded with standard surplus food redistribution ecosystem and moving toward a purpose-driven and tech-integrated model (CO2 tracking and targeted social support), GreenBite effectively beats other competitors, capturing a new segment of consumers

### 7.3 Low Fidelity Prototype Apps



Fig. 14: Log in page

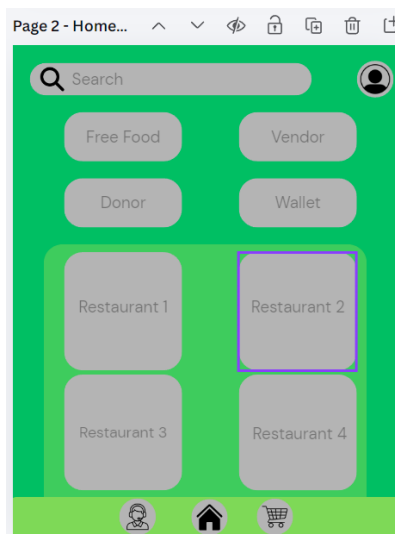


Fig. 15: Home page

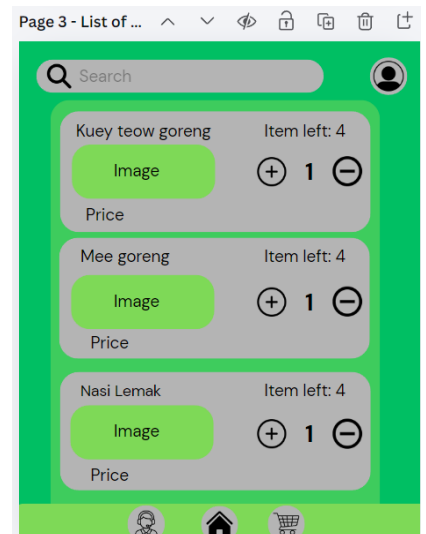


Fig. 16: List of foods

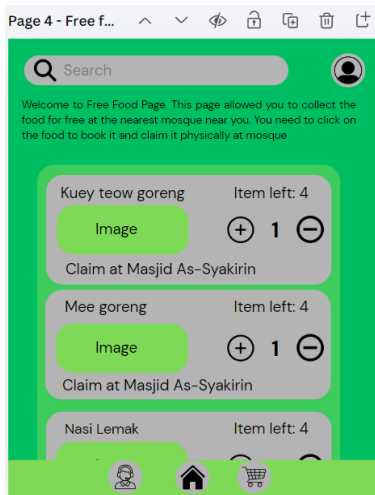


Fig. 17: Free food page

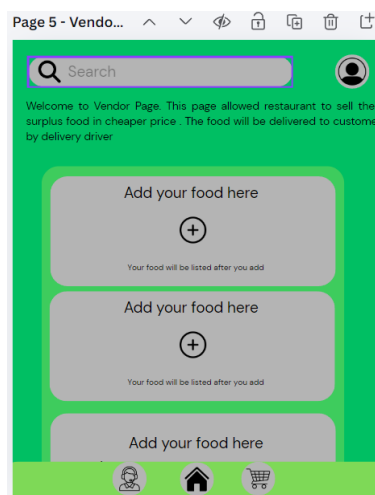


Fig. 18: Vendor page

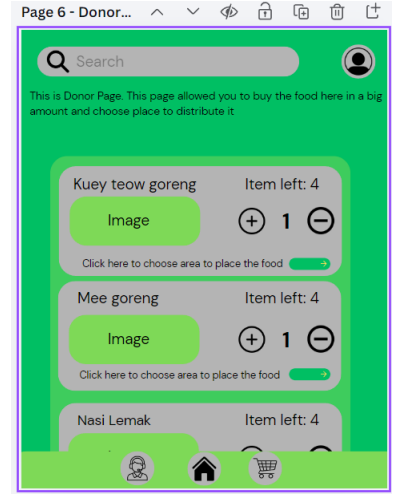


Fig. 19: Donors page

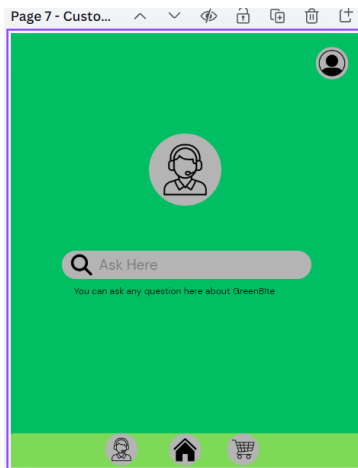


Fig. 20: Customer support page

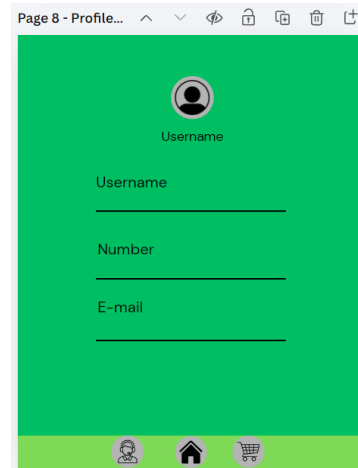


Fig. 21: Profile page

Fig. 14 until Fig. 21 is our proposed prototype for GreenBite mobile application. The prototype consists of eight pages which start with a login page. The login page where users can register and login to their account to use the provided services by GreenBite. All services provided will cover all our customer segments needs and demands. The homepage is where all the features of services provided are displayed. This will lead to another page that specifies services. There are several pages which are lists of food pages, free food pages and donors pages. These pages will display the food, and customers can choose whether to buy, claim for free and donate to others. Vendor pages is a service for vendors to list their food on the app. Customer support page to help users that need help to navigate through GreenBite. Lastly, the user profile page for users to add, update or delete their information.

## 8. CONCLUSION AND FUTURE WORKS

This paper proposed GreenBite, a multi-sided digital platform designed to address the normalized issue of severe food waste and food insecurity among Malaysia's B40 communities. By providing a platform where both F&B vendors and low-income consumers and donors, Greenbite creates a blue ocean market space that emphasizes affordability, surplus food redistribution and sustainability over pure convenience. Using design thinking, the validated Business Model Canvas (BMC) and Value Proposition Canvas (VPC) shows the platform's economic viability and is aligned with the 13th Malaysia plan and MYDIGITAL. Ultimately, Greenbite serves as a comprehensive platform to minimize food waste and enhance food equity.

To ensure Greenbite potential is attained, future work will focus on creating the full-scale system development. This can be achieve by changing the low fidelity prototype into fully functional application and building a scalable backend to handle

real time database transactions. The system should also have a sustainability metric algorithm that is accurate, data driven algorithm for the carbon footprint reduction tracker to show the actual impact of the rescued meals. Lastly, to expand Greenbite potential, it shall establish connection with local NGO's, government welfare agencies and sponsors to ensure the long term run of the application and scalability of the platform's donation mechanism.

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