ONLINE CLOTHES SELLING AND DONATION MANAGEMENT SYSTEM

By

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A REPORT

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ABSTRACT

In this era of rapid technological advancement and heightened living standards, the ubiquitous accessibility of information and innovative tools stands out. Yet, the surging issue of textile waste, propelled by the fast fashion phenomenon, casts a shadow. Even with a growing recycling consciousness, affordable and transient fashion trends exacerbate textile discard rates, directing a concerning volume into landfills. To address this, this study introduced a mobile application tailored to facilitate sustainable wardrobe management. Employing the Agile Development methodology and crafted using Android Studio with Firebase integration, the system boasted three distinctive features: an online marketplace for reselling secondhand clothing, a dedicated platform for users to donate their apparel to charitable organizations, and a unique rewards system. This reward feature incentivizes and acknowledges users for their charitable donations, further encouraging sustainable practices. The Agile approach segmented the project into focused sprints, emphasizing continuous integration, testing, and adaptability rooted in real-time feedback. Upon completion, user testing was initiated, with feedback overwhelmingly positive. Users lauded the intuitive interface, smooth marketplace transactions, effortless donation processes, and the rewarding experience offered, confirming the application's efficacy in addressing textile waste and promoting environmentally conscious behaviors. In the evolving landscape of technology and sustainable practices, the system was developed with objectives centering around combating the "throwaway" culture, providing an integrated solution for selling and donating old clothes, and enhancing user experience with a rewarding and intuitive interface. These objectives were realized as users now have a seamless platform that not only encourages the resale and donation of clothing but also incentivizes sustainable behavior through an innovative rewards system, all while offering advanced search capabilities and promoting a reduced textile waste footprint.

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LIST OF ABBREVIATIONS

5R	Refuse, Reduce, Reuse, Recycle, and Recover
C2C	Customer to Customer
NGO	Non-governmental Organization
SDG	Sustainable Development Goal
OS	Operating System
ETA	Estimated Time of Arrival
API	Application Programming Interface

CHAPTER 1 Introduction

1.1 Background

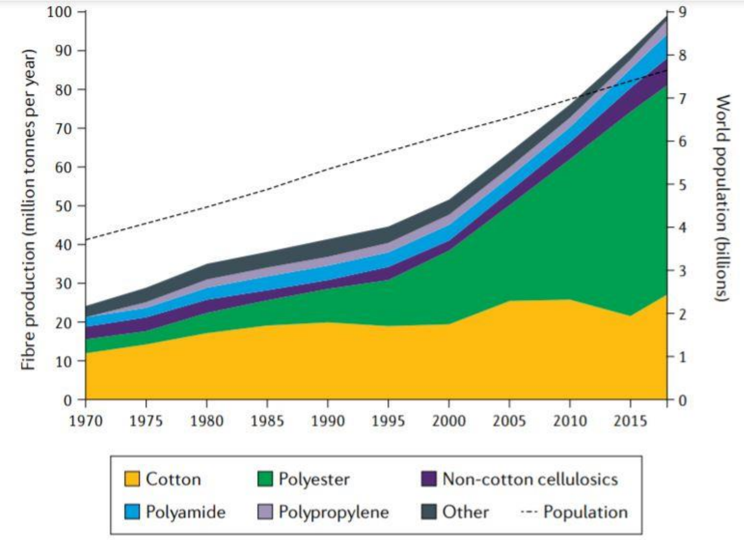


Figure 1.1a: Growth in global population and textile production by fibre type (Source: [23])

The number of garments has been rapidly expanding in the last few decades. As figure 1.1a shows, the rise of cheap manufacturing and fast fashion had stimulated the growth of textile-production overtook world-population growth. Other studies also proved that textile and apparel have produced 20 percent of global production waste and the root cause of it is the rise of fast fashion that attract the youth to purchase unnecessary clothing [1,2]. Fast fashion refers to "a strategic concept to capitalize on rapid inventory turnover through the implementation of a short renewal cycle and limited supply" [3]. Those global clothing brands such as UNIQLO, H&M, Cotton On, and Forever 21, frequently introduce new collections at cheap prices caused consumers willing to follow the latest trends and purchase the newest garments aggressively, which has caused an almost doubled number of garments that have been produced in the last 15 years [4]. Because of the existing clothes goes out of fashion frequently, it drives the consumers' motivation to replace those existing clothes by purchasing the new one, end up creating an endless buying-selling loop [2]. In 2018, [5] reported that Malaysia throwed out a staggering 195,300 tons of fabric into landfills, and the amount of textile waste entering to landfills had a significant increased from 2.8% in 2012 doubled to 6.3% in 2018. The leakage of poisonous by-product as a consequence of the textile manufacturing process into the environment has been a serious global problem. Research shows that high volumes of waste textiles are ending up in landfill sites every year, which produce large quantities of pollution, hazardous chemicals, micro-plastics, textile waste, and greenhouse gas emissions [14]. In addition, the worldwide trading of the textiles and clothing has a remarkable change due to Covid-19 pandemic in 2020 according to Fashion United [6]. The trading of clothing saw a 9.1 percent reduce in 2020, however, the textiles saw a strong grow of 16 percent due to the demand for protective personal equipment such as glove, mask, and alcohol wipe [6].

There is various method to eliminate the “throwaway” culture that caused by fast fashion. Because of the chemical pollution that released from the fashion factory, it become more costly to the environment when no sustainable materials or renewable resources are used. Therefore, one of the examples to reduces the ecological footprint of fashion is selling secondhand clothes. Secondhand shopping has become more popular among consumers. It is the one of the fastest growing sectors in the global fashion marketplace [7] and is recognized as an effective solution to reduce textile waste and minimize the pollution [2]. The market analytics firm, GlobalData, observed that the secondhand clothing market has expanded 11 times faster than traditional retail, and the value is expected to be worth $84 billion by 2030, which is the double of fast fashion that projected to be worth around $40 billion at the same time [8]. A study indicated young consumers are motivated to buy secondhand clothing because of the affordable prices and environmental benefits [9]. Apart from physical secondhand stores, online secondhand market is currently regarded as one of the biggest trends in the retail industry. There are increasingly online secondhand and consignment stores where available for consumer to purchase old clothing. According to ThredUp 2021 Report, more than 70 percent of consumers commented that shopping for secondhand clothes has become more convenient than 5 years ago with the help of the technology and online marketplaces [10]. However, by referring to the result of the study [2], consumer have no positive attitude towards secondhand clothing due to the concerns about cleanliness. Consumer worried about the clothes that are not clean are likely to have stains or dirt that contaminate the body while wearing the product.

Except for the purchasing of secondhand clothing, clothes donation is also a useful approach to reduce textile waste. By donating the used clothes to charity, it helps us to extend the life cycle of clothing and provide a sustainable environment for the future generations. Eventually, it can achieve the “Reuse” principles which stated in the 5R strategy of waste management [11]. In Malaysia, there is number of companies and NGOs such as iCycle Malaysia, Kloth Cares, and H&M offer the clothes donation service by placing the donation box in shop or somewhere in residential areas [11]. Donors just need to pack the item they want to donate and put it inside the donation box or contact the organization, then the respective organization will collect the donation at the donation box or the donor’s house and distribute them to the places where they are needed. However, a study entitled “Preloved Donation Mobile Application” performed by [12] has stated the several problems of current donation method in Malaysia. This study observed that the donation box has a potential for being stolen in a public area and people have difficulty to reach to the donation box if it is far away from their house [12].

1.2 Problem Statement

There are many C2C e-commerce marketplaces available for people to buy and sell brand new or used items. The pros of C2C marketplaces like Mudah and Carousell include allowing buyers to search for the cheapest price on secondhand clothes, and sellers to earn extra money by selling used clothes. This seems like a win-win situation for both participants; however, there are situations where not all secondhand clothes can be sold on these online marketplaces. Clothes might lose value due to low popularity, poor condition (e.g., stains, furring, discoloration, etc.) or lack of branding [2]. None of these online secondhand marketplaces provide services or solutions for sellers on how to deal with worthless and unsalable secondhand clothes. In the end, clothes that cannot be resold eventually end up in the rubbish bin, contributing to more textile waste and undermining the goals of SDG 12 (Responsible Consumption and Production).

On the other hand, most charity organizations provide a money donation option on their websites, allowing people to transfer funds by clicking the "Donate" button. In Malaysia, there is still a lack of charities offering online services for item donations. Typically, people search for the contact number of a charity organization on its website, and then call to arrange for the collection of donations at their homes. However, it can be difficult to convey full address details through a phone call, and charity staff may need to handwrite the full address on paper. Moreover, it can be challenging for charity staff to handle a large number of phone calls simultaneously without a proper management system, especially during a disaster. Additionally, people can search for donation box locations on Google Maps or the donation box provider's website. However, as mentioned earlier, this method's weakness is that it can be difficult for people to reach donation boxes due to the long distance between their homes and the donation box locations.

1.3 Motivations

It is important for an online secondhand marketplace to provide a service for helping user on how to recycle, repurpose, or reuse their old clothes instead of selling it. Some secondhand clothing store like ThredUp only accepted certain brands of clothing that are valuable and can be sell in their online shop [15]. It is critical to promote proper textile disposal practices to teach people how to repurpose or donate their old clothes is essential to reduce the environmental impact of textile waste [25]. Despite growing awareness of the need for recycling, major population still have minimal understanding about the textile disposal practices [25]. A study argued that the unawareness of the need for clothing recycling is often linked to lack of media coverage [26]. Therefore, there is a need of an online platform not only for selling secondhand clothing, but for promoting and educating people the social and environmental impact of used clothes. In this year 2022, the concept of selling secondhand clothing can be carry out in current eCommerce as many reports projected that the secondhand clothing market will expand doubled or even more in the next few years [7 - 8, 10, 13]. Furthermore, there is no item donation application for people to deliver their donation currently in Malaysia.

1.4 Project Objectives

- To provide a mobile application that consists of multiple functions for the user who did not know how to deal with their old clothes, thereby, reduce the rate of "throwaway" culture.

- To develop an online secondhand clothes selling and donation mobile application that offers a comprehensive solution for users to efficiently manage their used clothing, including seamless integration of selling and donating options, thereby addressing the limitations of existing systems and promoting sustainable practices.

- To enhance the user experience by implementing a user-friendly interface with advanced filtering and search capabilities, as well as incorporating a reward system that encourages users to donate their used clothing, ultimately reducing textile waste and providing a convenient platform for users to contribute to a more sustainable environment.

1.5 Project Scopes

The scope of this project is to develop a secondhand clothes selling and donation mobile application which is an innovation to help users clean out their closet in an effective and environmentally friendly way. The proposed system will be designed as a mobile application that can run on android operating system. This secondhand clothes sales and donation mobile application will provide the main sections which are the marketplace section that allow user to sell, purchase or donate secondhand clothes, and cloth donation section that contains the information of the nearest charity organization based on user location. Moreover, it will also have a reward system built into the donation section.

1.6 Contributions

Since the fast fashion and textile waste has become one of the biggest environmental problems in this generation, combining the concepts of secondhand clothing marketplace and cloth donation can be introduced for reducing the rate of throwaway culture. By observing the upward trend of secondhand marketplace in these days, it is a good opportunity to create an online secondhand clothing marketplace which promote the positive impact of secondhand clothing and the negative impact of fast fashion toward the environment. By promoting the effects between secondhand clothing and fast fashion, it can change the perspective of people and motivate people to purchase those environmentally friendly secondhand clothes [19]. However, online marketplace is not effective enough to solve the problem. As previous stated, there are still exist a weakness in online marketplace, the used clothes that are no brand or worthless have a chance to stay in the marketplace for a long time and still not sold, even though most of these clothes are clean and have no defects. For the evidence, there are several secondhand clothing for sales in Carousell has been staying at the marketplace for about 1 to 6 years and still not been sold [20]. Therefore, cloth donation can be an alternative solution to help seller to clean out their used clothes for sale in an eco-friendly way. On the other hand, donating old clothes not just good for the environment but can also help raise money for a good cause [24]. Moreover, people can have more interaction with charity organization via this online donation platform, thereby, narrow the gap between charities and people.

CHAPTER 2 Literature Review

2.1 Previous Works on Online Secondhand Clothing Store

2.1.1 **ThredUp** (Source: [15])

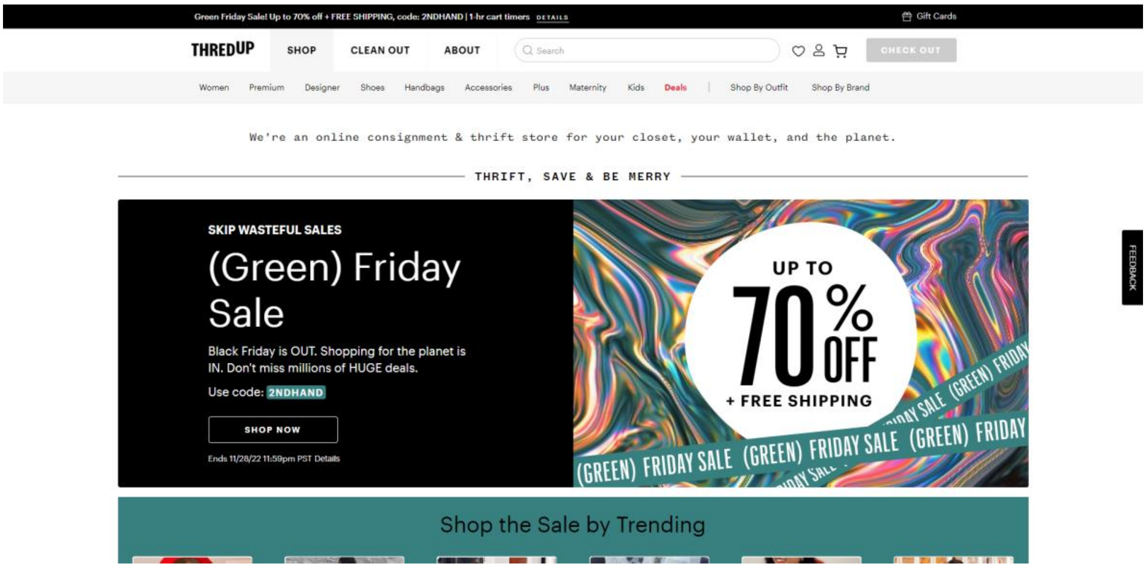


Figure 2.1.1a: ThredUp Homepage

The company, ThredUp, is the largest online clothing consignment store in the world that allows user to enjoy the convenience of online shopping with the low pricing of thrift shopping. It is also a perfect example of a sustainable fashion company that has adapted to its environment and industry. From 2009 when Thredup was born until the end of 2021, they have successfully processed more than 137 million items and displacing over 1.3 billion pounds of carbon dioxide emissions [13].

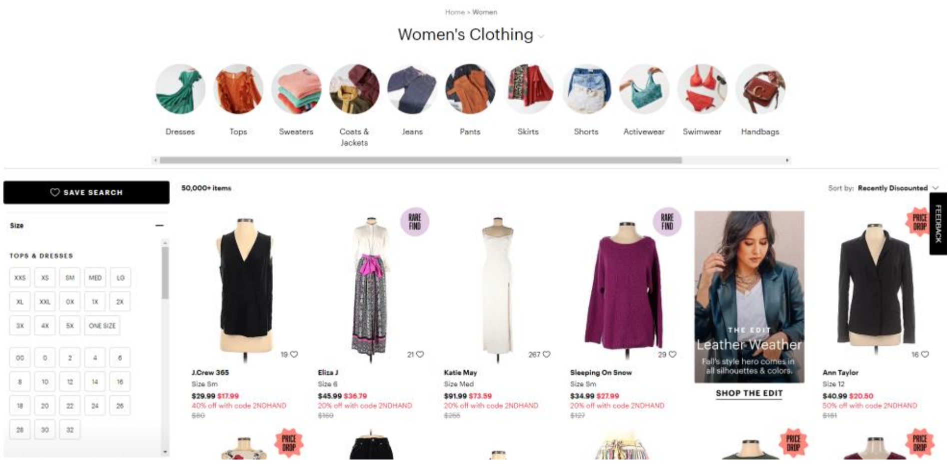


Figure 2.1.1b: ThredUp Shop

In ThredUp "Shop" page, it provides multiple type of secondhand clothing, from top (hat) to bottom (shoes) for user to choose. It can be problematic to navigate the site with so much choice without a filtering feature. A good filtering is especially needed when an online store offers many different categories or product items, or when an assortment has several attributes and possible combinations. As the figure (Figure 2.1.1b) shown, the customization of filtering is implemented at the left-hand side for user to select their preference. ThredUp provides multiple options of filtering. User can select the secondhand clothing based on sizes, category, brand, price, color, condition, material, pattern, and accents. On the other hand, the difference between online clothing shop and thrift shop is the product for sale at online clothing shop is directly supplied from the fashion industry with large quantity, different sizes and colors, so the buyer can search one cloth with different sizes and colors; however, the product for sale at thrift shop is supplied from the owner who want to sell his/her clothes, so buyer can purchase the clothes with certain size and color only. Because of the limited quantity and style of clothing, filtering feature is important for an online secondhand store to save user's time on choosing the secondhand clothing from the list that is available and also matched with user's preferences.

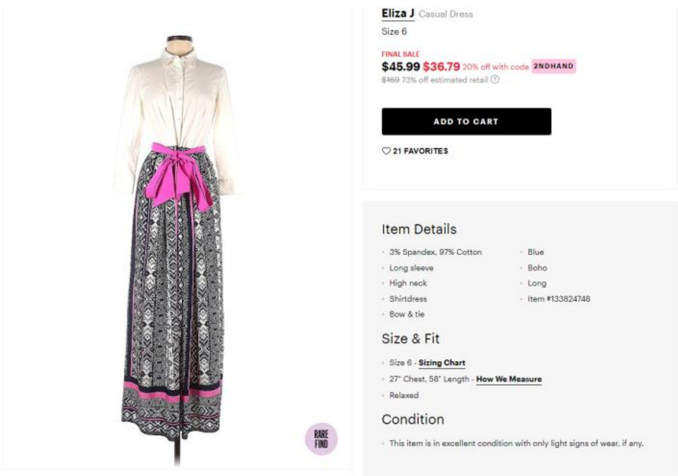
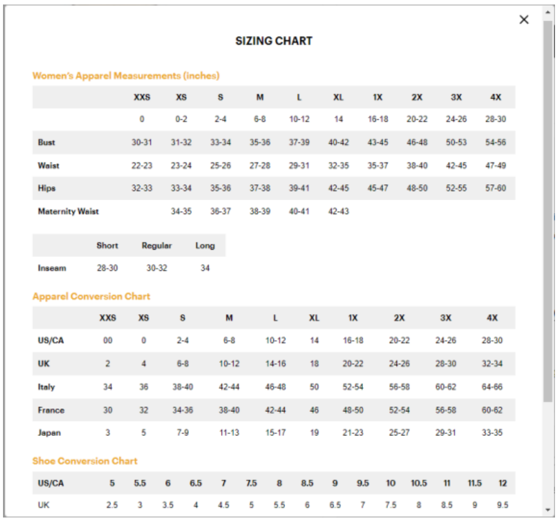


Figure 2.1.1c: ThredUp Product View



SIZING CHART

Women's Apparel Measurements (inches)

	XXS	XS	S	M	L	XL	1X	2X	3X	4X
	0	0-2	2-4	6-8	10-12	14	16-18	20-22	24-26	28-30
Bust	30-31	31-32	33-34	35-36	37-39	40-42	43-45	46-48	50-53	54-56
Waist	22-23	23-24	25-26	27-28	29-31	32-35	35-37	38-40	42-45	47-49
Hips	32-33	33-34	35-36	37-38	39-41	42-45	45-47	48-50	52-55	57-60
Maternity Waist		34-35	36-37	38-39	40-41	42-43				

	Short	Regular	Long
Inseam	28-30	30-32	34

Apparel Conversion Chart

	XXS	XS	S	M	L	XL	1X	2X	3X	4X
US/CA	00	0	2-4	6-8	10-12	14	16-18	20-22	24-26	28-30
UK	2	4	6-8	10-12	14-16	18	20-22	24-26	28-30	32-34
Italy	34	36	38-40	42-44	46-48	50	52-54	56-58	60-62	64-66
France	30	32	34-36	38-40	42-44	46	48-50	52-54	56-58	60-62
Japan	3	5	7-9	11-13	15-17	19	21-23	25-27	29-31	33-35

Shoe Conversion Chart

US/CA	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12
UK	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5

Figure 2.1.1d: ThredUp's Sizing Char

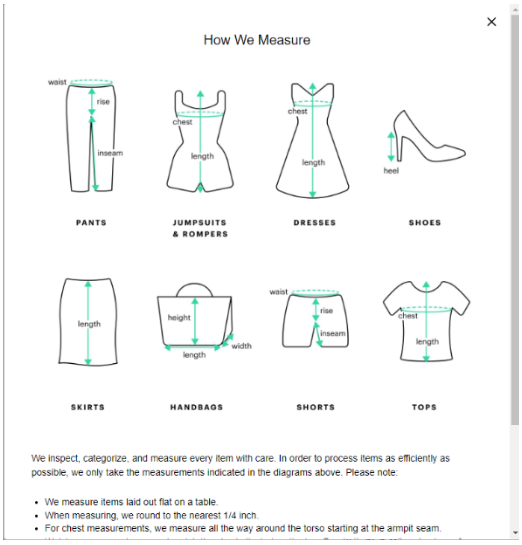


Figure 2.1.1e: ThredUp "How We Measure"

In ThredUp Product View, it contains an "Add to Cart" button and the details of a secondhand cloth. The detail of secondhand cloth consists of the original price, price after discount, item details, size of the cloth, and condition of the cloth. There is one mentionable information that shown in Figure 2.1.1c which is significant for selling secondhand item, it is the condition information of the cloth. ThredUp classified the condition of secondhand clothing into 4 levels which are "New with Tags", "Like-New", "Gently Used" and "Signs of Wear". As stated previously, customer did not like to buy secondhand clothing, most of the reasons is they concern about the cleanliness of the secondhand clothing. Therefore, stating the condition of the secondhand clothing helps certain users who are more concerned about cleanliness to make decision based on the condition of the clothing, whether they want to buy or not. Moreover, if users move the mouse cursor point to the photograph of the clothing, it will automatically zoom in the photograph for users to view the condition of the clothing clearly. At the "Size & Fit" section, it has provided the sizing chart (refer to figure 2.1.1d) and the measurement of each product category (refer to figure 2.1.1e) for user to determine the accurate size of the used clothing that fit with their body.

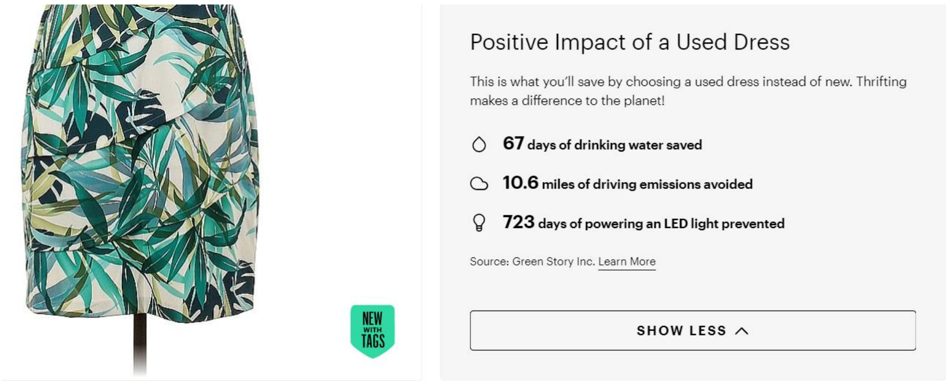


Figure 2.1.1f: ThredUp Positive Impact of a Used Dress

Every secondhand clothing for sale in ThredUp has labeled the positive impact to environment based on the category of product. As figure 2.1.1f shown, it shows the positive impact of a used dress in Dress Product View. There is a need for a thrift shop to emphasize the positive ramifications of wearing secondhand clothing to the environment because the environment value is the most significant predictor of attitudes towards secondhand clothing [18]. By showing this kind of information in each secondhand product, the buyers can acknowledge how they can save planet by purchasing a secondhand clothing. They also see themselves as a part of contributing to the protection of the environment and as a part of achieving the Sustainable Development Goal. Furthermore, a secondhand store can actively promote the negative consequences of fast fashion and the positive consequences of secondhand fashion to the public, thereby gradually changing the negative public perceptions of secondhand fashion [19].

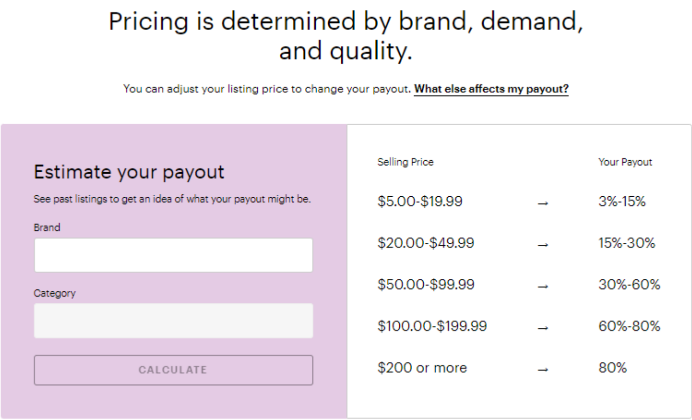


Figure 2.1.1g: ThredUp Payout Estimation

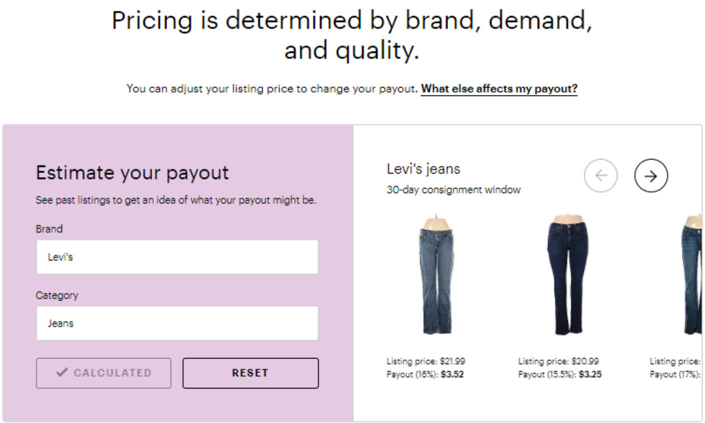


Figure 2.1.1h: ThredUp Payout Estimation Result

ThredUp also provide the "Payout Estimation" feature for users who want to sell their used clothing to estimate the value of the used clothing based on the brand and category. For example, in figure 2.1.1h, the selected brand is Levi's and the category chosen is Jeans. After clicking the "Calculate" button, it showed the result of Levi's Jean listing price and payout with a percentage at right-hand side. The formula to calculate payout's value is (Listing price * Percentage of Payout). For example, the listing price of Levis's Jean is $21.99, and the percentage of payout given by ThredUp is 16%. After clicking "Calculate" button, the payout amount of the Levi's Jean will be $21.99 * 16% = $3.52, which is the payout amount that users will get if they sell the secondhand Levi's Jean to ThredUp company. However, this calculation does not take into account the condition of the secondhand clothing, so the actual payout amount may vary after ThredUp staff receive and inspect the condition of the secondhand clothing.

2.1.2 **Luxury Vintage** (Source: [16])

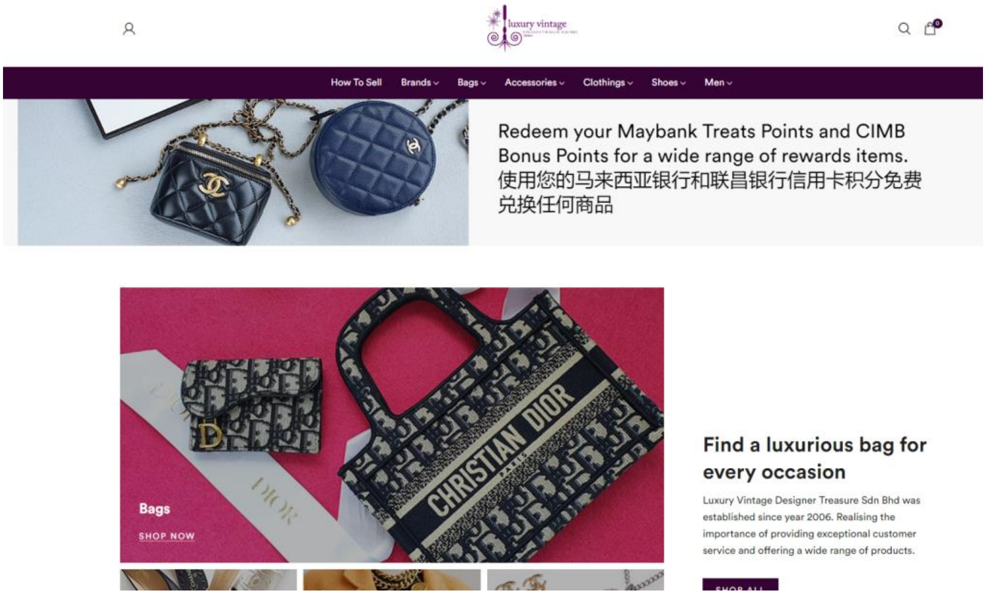


Figure 2.1.2a: Luxury Vintage Homepage

Though there are online thrift stores that cater to every segment of the secondhand market, Luxury Vintage stands out for its specific concentration on luxury labels such as Christian Dior, Louis Vuitton, and Prada, among others. Luxury Vintage Designer Treasure Sdn Bhd was established since year 2006. This company rapidly expanded in term of customer recognition and market acceptance, and it is now recognized as the market leader in the business of new and open-box mint condition consigned designer product in Malaysia. Users can use their online marketplace to buy and consign their own preloved luxury clothes, bags, and accessories, and the company's experts evaluate each and every listed item for 100% authenticity.

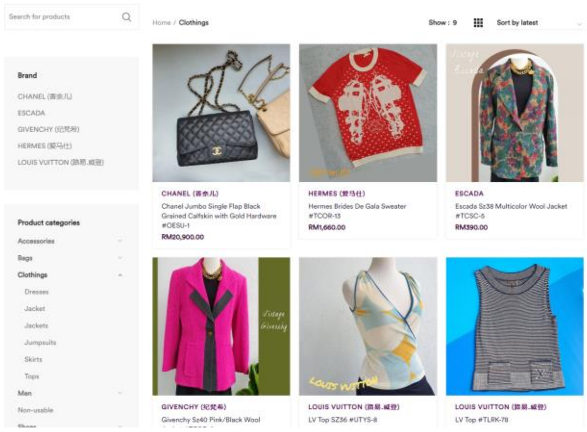


Figure 2.1.2b: Luxury Vintage Shop Page

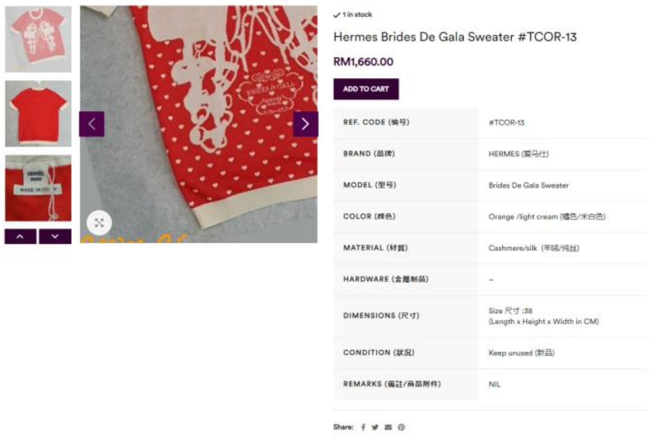


Figure 2.1.2c: Luxury Vintage Product View

In Luxury Vintage Shop Page (refer to figure 2.1.2b), it also has the filtering feature at the left-hand side of the webpage. It provides the two options of filtering; user can select clothing based on the product brands and product categories. Inside the Luxury Vintage Product View (refer to figure 2.1.2c), it contains the picture, reference code, size, condition and other information of the clothing. The filtering feature in Luxury Vintage Shop Page only provide 2 options which are product brands and product categories, it is not sufficient for users to find the secondhand clothing that fit their body. Users cannot search their preferred clothing size by using the filtering feature. The size of clothing only labelled at the Product View, which means users must click on every product to go inside the clothing's Product View to check the size of the clothing, which caused more redundancy and waste of time.

Figure 2.1.2d: Product Share Button

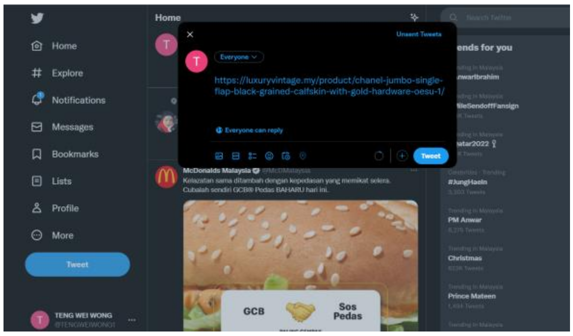


Figure 2.1.2e: Luxury Vintage's Twitter Share

Luxury Vintage has implemented four social sharing buttons including Facebook, Twitter, Email, and Pinterest in each of the Product View. Social sharing button or social media button is clickable icons displayed on some web pages to allow the website visitors to share the content with their personal social networking profiles. Users can click the social sharing icon that shown in the figure 2.1.2d, then the system will automatically open the social media website based on user's selection and paste the link of the product to the social media post (refer to figure 2.1.2e). By adding these social sharing buttons, the sellers can promote their used clothing by using their own social media marketing strategy to gain the awareness of their selling product via social media platform. A past study [17] supported that there is a significance influence between social media marketing and e-commerce consumer loyalty. A good review posted on social media can increase consumer confidence and improve the reputation of an online store in e-commerce. This factor is significant for an online secondhand store. The main reason people have negative attitudes towards used items is that they have trust issues in the condition and cleanliness of used item. Therefore, having good reviews on the condition and cleanliness of the used clothing received by consumers can remove the negative impression people have about used clothing, which in turn can improve business from consumer's word-of-mouth.

2.1.3 **Carousell** (Source: [20])

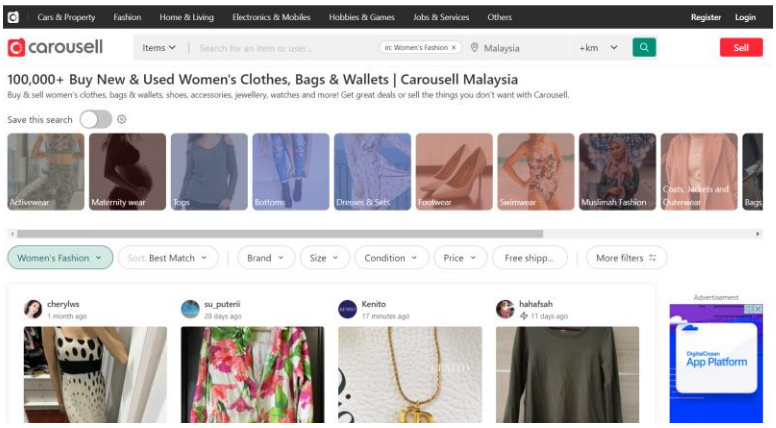


Figure 2.1.3a: Carousell Women's Fashion

Carousell is a mobile and web-based consumer to consumer (C2C) and business to consumer marketplace for buying and selling new and secondhand goods. Carousell offers a digital marketplace giving millions of users across Southeast Asia the chance to sell and buy brand new or used item easily. There are over 1 million live listings, 194 categories (and counting) ranging from fashion to furniture and decor. Even jobs, services, and properties. In this paper, the author will focus on the fashion category and evaluate the overall functionality that users can interact with on Carousell website.

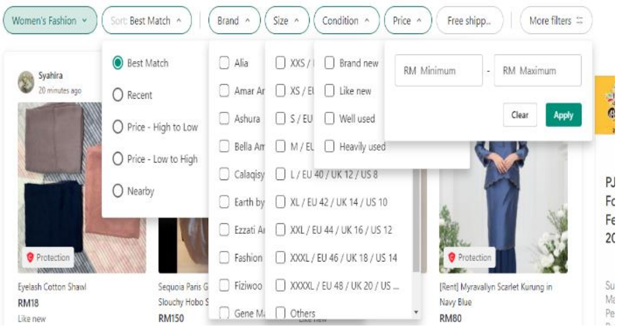


Figure 2.1.3b: Carousell Filtering Setting

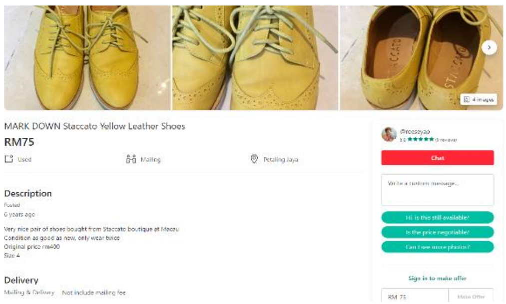


Figure 2.1.3c: Carousell Product View

Carousell provide the filtering setting that is similar with ThredUp. From the left to the right of figure 2.1.3b, the filtering setting consists of clothing categories, sorting, the brand, sizes, condition, budget price of clothing and free shipping category respectively. In Carousell's Product View (refer to figure 2.1.3c), it contains the basic things that is needed for an online secondhand shop such as the title of product, price, description, delivery method, and condition of the product. User can directly chat with the product owner by clicking on the "Chat" button which is implemented at the right hand-side of the figure 2.1.3c. Besides, buyers can contact sellers through many online platforms such as WhatsApp, Messenger, Instagram or buyer can call them directly through phone number if the sellers have provided phone number at their profile.

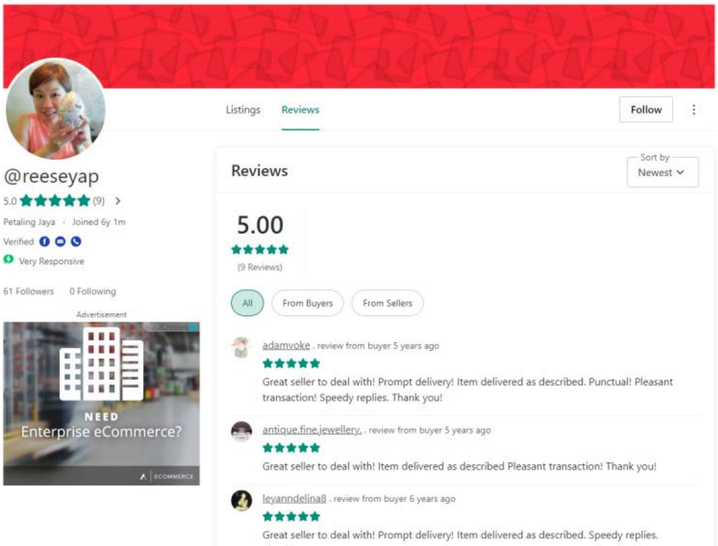


Figure 2.1.3d: Carousell Seller's Review

Moreover, buyers can rate the seller by giving a review after they purchased and received the product. This is important because buyer can determine the seller is trustable or not depends on the rating system. The rating features has played a significant role in a C2C e-commerce because there are higher rates of fraud. This doesn't just happen on the buyer's side; it can happen on the seller's side as well. For example, the buyers could receive a secondhand clothing that is damaged or dirty, not as same as the picture or the condition that seller stated at the product's view. Nevertheless, sellers could also receive a fake payment from the buyer side after they send the product to buyer.

2.2 Limitation of Previous Studies

2.2.1 Limitation of ThredUp

ThredUp is a successful online clothing consignment store that encourage people to build a sustainable environment by resell the secondhand clothing. ThredUp accepted all the clothing brand consigned by customer, however, they only payout for certain brand of used clothing such as ZARA, Adidas, and GUCCI. There is a list of ineligibles for payout brand including UNIQLO, H&M and Forever 21. Most of these brands are cheap and trendy, which are the characteristics that caused fast fashion problem [4]. This may not motivate the users to consign their used clothing since they did not get paid or any benefit by selling those ineligibles payout brands in ThredUp website. By solving this problem, the company can implement reward system for the ineligibles payout brand. A study has found that monetary incentives or rewards can promote pro-environmental behaviours [25]. User can earn point from consigning those ineligibles payout brands to ThredUp and get reward like discount coupon when they reach certain points.

2.2.2 Limitation of Luxury Vintage

Luxury Vintage is an online secondhand marketplace that focus on selling luxury brand clothing. The filtering setting of Luxury Vintage is not sufficient for a user to search their preferred clothing because it only provided two type of filtering which are the brand and category. This has caused inconvenience for the users to search the size of cloth which is fit with their body because the size of cloth only labelled inside the product view. Without the size filtering, users need to check the size of clothing by clicking every product one by one, which eventually degrade the shopping experience of users when using it.

2.2.3 Limitation of Carousell

Unlike the other reviewed system, Carousell is a customer-to-customer online marketplace, which means that users can be a buyer or a seller, or both while using Carousell. Because of this feature, users can sell any secondhand clothing in Carousell. Although this gives user more flexibility to search out the cheapest price of secondhand clothing, however, there are still many secondhand clothing which are worthless and no brand selling in Carousell for a few years and still haven't sold. Carousell does not provide the service to deal with these secondhand clothes. At the end, these secondhand clothes will eventually go into rubbish bin, which cause more textile waste and violate the objective of SDGs.

Table 2.3 Comparison between the reviewed systems and proposed system

System / Function	ThredUp	Luxury Vintage	Carousell	Proposed System
Filtering Setting	- Sort by - Size - Discount Percentage - Category - Occasion - Style - Brand - Price - Color - Condition - Material - Pattern - Accents	- Brand - Category	- Category (include Muslim Fashion) - Sort by - Size - Condition - Price - Free Shipping	- Sort By - Size - Category (include Muslim Fashion) - Condition - Price - Material
Enlarge product image	✓	✓	✗	✓
Social Sharing Button	✗	✓	✓	✓
Label of positive impact of used clothing	✓	✗	✗	✓
Review and Rating system	✗	✗	✓	✓
Payout Estimation	✓	✗	✗	✓
Cloth Donation	✗	✗	✗	✓

Reward System	✕	✕	✕	✓

2.4 Proposed Solutions

After reviewing these 3 similar existing systems, they still have their own strengths and weaknesses. Because some of the online secondhand shop only accept limited brands and does not provide any services for user to deal with those worthless and no brand used clothing, implementing a cloth donation module is a best solution to solve these kinds of problems. Nowadays, most of the online resale marketplace only offer a channel for users to sell used clothing, but there is a risk that some of the secondhand clothing have not been sold within a period. In Carousell, there are several secondhand clothing that have been staying at the marketplace for about 1 to 6 years. Hence, the cloth donation module is needed to provide another option for the users to clean out their closet. This can also maximize the functions of an online secondhand shop to create a sustainable environment by providing multiple method for user to clean their closet. Furthermore, in order to reduce textile waste, a reward system can be implemented in an online secondhand shop to encourage people donate their used clothing instead of throwing it to dustbin [25].

For the proposed cloth donation module, if a user chooses to donate their clothes, the system will search the nearest charity organization based on user's location. User can select the charity organization they want to donate. Besides, user can also choose the delivery method whether they want to self-deliver or need a third-party deliver to deliver their cloth donation. After that, the system will send a confirmation message to the selected charity organization. Once the charity organization received the donation and click "Confirm", the user will earn the reward point based on the weight of clothes they donated.

Cloth donation not only can save the environment, but this method can also help those refugees who just experienced a disaster or a war to get the enough quantity of donated clothes in a short time. In order to attract more adult shop at online secondhand clothing shop, the convenience is an important element to improve user's online shopping experience. Therefore, a good filtering setting like ThredUp and Carousell is needed to bring convenience for user to search their preferred secondhand clothing.

CHAPTER 3 System Methodology/Approach

3.1 System Development Methodology

3.1.1 Study of Existing System Development Methodology

Software development life cycle, as known as SDLC, is a process used by software development teams to design, develop and test the software to enable the production of high-quality, low-cost, in the shortest possible production time. The phases in methodology can vary, and some of them may overlap or be iterated multiple times, depending on the specific methodology being used. However, generally they consist of some or all of the phases, including planning, analysis, design, implementation, testing, and deployment. There are a number of methodologies that are efficient for develop certain software project, and all of them have their pros and cons. Therefore, choosing a software development model is a crucial decision that can impact the outcome of a project, determining whether it will succeed or fail. It is essential to select the most suitable model that aligns with the project's needs and requirements to ensure its success. This paper aims to compare three popular software development methodologies which are **Agile**, **Waterfall**, and **Throwaway** methodologies, to determine the most suitable approach for developing the proposed system. The objective is to evaluate the strengths and weaknesses of each methodology and identify the one that best aligns with the project's needs and requirements.

a) Agile Methodology

Agile methodology is a flexible and iterative approach to software development that emphasizes collaboration, customer satisfaction, and adaptability to change [27]. It is based on the Agile Manifesto and is designed to deliver software in a series of short iterations or sprints [27]. Agile methodologies, such as Scrum and Kanban, focus on breaking the project into smaller, manageable tasks, prioritizing them, and delivering working software in short iterations. Agile methodology is highly suitable for projects that require flexibility and adaptability, with changing requirements or user needs. In the Agile methodology, the code is designed to be easily maintained and updated over time, and adjustments are made as needed during each sprint.

The Agile methodology offers several advantages for single developer mobile projects. Its high adaptability to changing requirements and user feedback is crucial for mobile development, which often requires frequent updates and feature additions [28]. Agile also enables frequent releases of working software, which allows for early detection and resolution of issues. Continuous testing and integration ensure high-quality code and a reliable application, while the methodology's focus on collaboration and communication can benefit a single developer who may be working with external stakeholders.

None of the methodologies are perfect. One critical problem of Agile methodology is that it can sometimes result in a lack of documentation [27-28]. Since the emphasis is on working software over comprehensive documentation, it can be challenging to keep documentation up-to-date and accurate throughout the development process. This can result in increased risk and lower quality of the final product [28]. Furthermore, its minimal documentation approach may make it difficult for others to understand the code or maintain it in the future. Additionally, the iterative nature of the process may lead to challenges in accurately estimating project timelines and budgets.

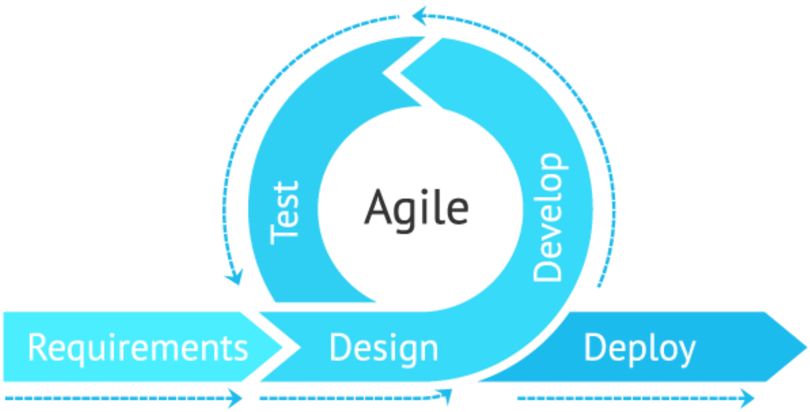


Figure 3.1.1a: Agile Development Methodology Diagram (Source: [22])

b) Waterfall Methodology

Waterfall methodology is a linear and sequential approach to software development where each phase of the development process follows the previous one, and there is no overlap or iteration [29]. It is a structured and well-documented methodology that is suitable for projects with well-defined requirements and fixed timelines. Waterfall methodology is appropriate for projects that require extensive documentation and a clear project plan.

The Waterfall methodology's structured approach can provide a clear roadmap for single developer mobile projects with well-defined requirements. The extensive documentation generated during each phase ensures that the project's progress and outcomes are easy to understand and maintain [29]. Furthermore, the linear development process simplifies project management and ensures that all phases are completed in a logical order.

In contrast, Waterfall methodology is less flexible and adaptable to change compared with Agile methodology [29]. Once a phase is completed, there is no going back to make changes. This can be problematic if there are changes in requirements or user needs. Additionally, Waterfall methodology can result in lengthy documentation, which can be time-consuming and costly [29]. The extensive documentation and rigid structure may slow down the development process, which can be a disadvantage for single developers working on time-sensitive projects. It assumes that all requirements can be clearly defined and documented upfront. This can be challenging in complex projects or projects with changing requirements. Therefore, its inflexible nature can make it unsuitable for mobile development projects that require quick adaptation to changing requirements. Finally, any defects or issues may not be discovered until late in the project since testing is typically done at the end of the development cycle, resulting in higher costs and delays [29].

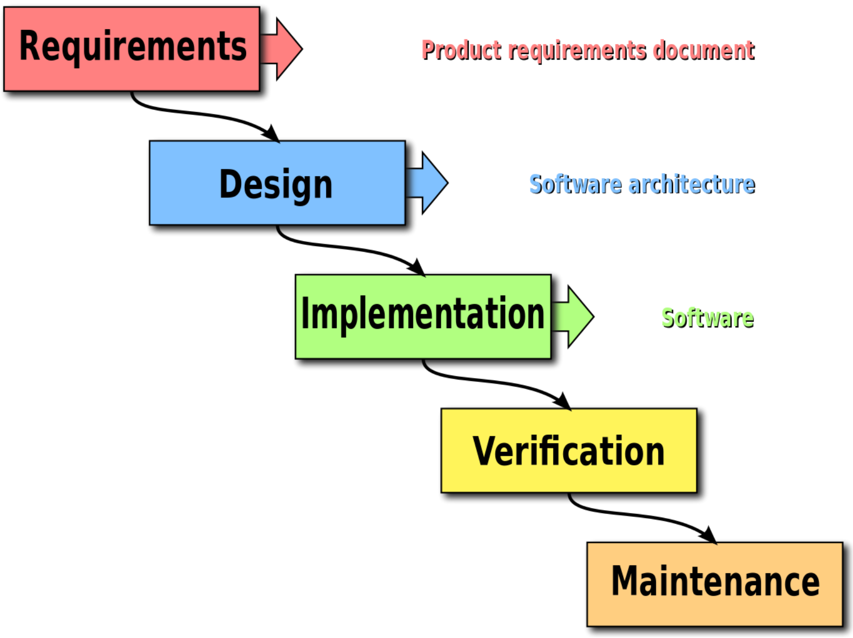


Figure 3.1.1b: Waterfall Development Methodology Diagram (Source: [35])

c) Throwaway Methodology

The Throwaway methodology, also known as Rapid Application Development (RAD), focuses on quickly building prototypes and discarding them once their purpose is fulfilled [30]. It is suitable for projects where the code does not need to be maintained over a long period and the emphasis is on speed rather than quality. Throwaway methodology can result in a lack of structure and documentation and may not be suitable for projects that require long-term maintenance or support.

The Throwaway methodology offers flexibility and speed, which can be advantageous for single developer mobile projects that require rapid prototyping or proof of concept. The lack of a formal development process allows developers to quickly experiment with different ideas and gather valuable feedback without investing significant time and resources in a full-scale project [30].

Throwaway methodology is suitable for projects where speed is more important than quality or maintainability. However, one significant disadvantage of the Throwaway methodology is that it often results in a lack of documentation and code reusability [30]. Since the code is designed to be discarded after initial development, it may not be well-documented or optimized for reuse in future projects. This can result in increased development costs and time if similar functionality needs to be developed in the future. Additionally, the limited testing and quality assurance associated with rapid development can result in a lower-quality final product, which may not be suitable for all types of mobile applications.

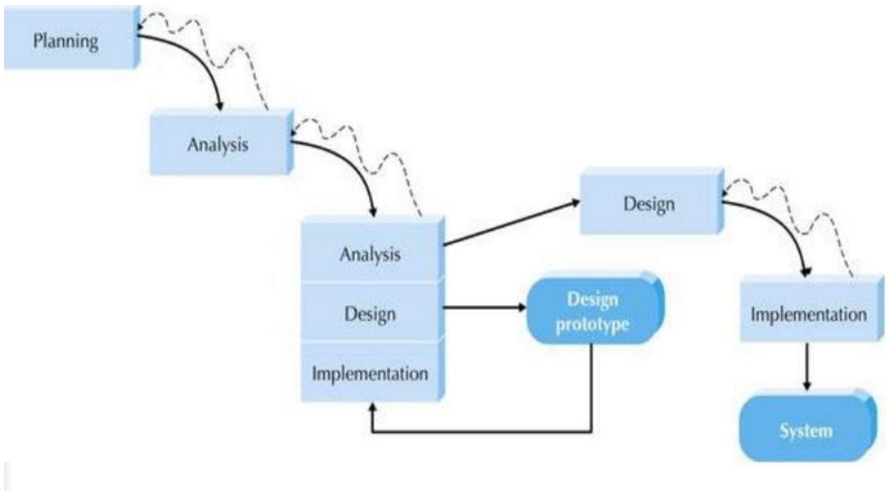


Figure 3.1.1c: Throwaway Development Methodology Diagram (Source: [36])

Table 3.1.2 Comparison of Reviewed Methodologies

Perspective	**Agile**	**Waterfall**	**Throwaway**
Development Process	Iterative and incremental	Linear and sequential	No formal process, code is developed quicky and discarded
Documentation	Minimal	Extensive	Limited or none
Flexibility	Highly flexible and adaptable to changing requirements	Inflexible, changes can be difficult and costly to implement	Flexible, but can result in a lack of structure and documentation
Quality Assurance	Continous testing and integration	Testing occurs at the end of each phase	Limited testing

Maintenance	Code is maintained over time, and updates are made as needed	Code is well-documented and updates are made according to a strict change control process	Code is discarded after initial development, and maintenance is not a priority
Suitability for Single Developer	Better for changing requirements, frequent releases	Better for well-defined requirements, clear project plan, extensive documentation	Better for rapid prototyping, proof of concept, less focus on quality
Adaptability to Mobile Development	Highly adaptable, allows for frequent updates and feature additions	Less suitable due to inflexible nature and assumption of well-defined requirements	Suitable for rapid prototyping and proof of concept, but may lack long-term quality

3.1.3 Suitable Methodology for the Proposed System

In conclusion, the choice of software development methodology depends on the specific needs and requirements of the project. For the proposed system, Agile methodology may be the most suitable approach, given the need for flexibility, adaptability, collaboration, and quality. Agile methodology has several advantages over Waterfall and Throwaway methodologies, making it a popular choice for software development teams.

For the proposed system, Agile methodology has several advantages over Waterfall and Throwaway methodologies. The development process of Agile methodology is iterative and incremental, which can help to ensure that the software meets quality standards and functional requirements. Its flexibility and adaptability is essential in mobile development projects where requirements and user needs can change over time. By breaking the project into smaller and manageable tasks, it enables the single developer to prioritize core features and quickly adapt to changes in the project's scope or requirements.

Furthermore, one of the most significant advantages is that Agile methodology is highly flexible and adaptable to changing requirements or user needs. The iterative nature of Agile development allows developer to respond quickly to changes, do continuous testing and make adjustments as needed. Mobile applications often require frequent updates and feature additions to stay relevant and competitive in the market. Agile methodology's highly adaptable nature is well-suited for such projects, as it allows the single developer to implement new features and improvements based on user feedback or market trends easily.

Last but not least, Agile methodology is a good fit for single developers working on mobile applications, as it allows for efficient management of tasks and priorities. By focusing on the most critical features and working in short iterations, the single developer can maintain a steady pace and ensure timely delivery of the project.

3.2 System Requirement

3.2.1 Hardware

The hardware that is required for developing this project involve a laptop and an android phone. These are the great tools for android mobile development. A developer can work on their development at anywhere and anytime due to their portability factor. The specifications of laptop and android phone for developing the system will be shown in the following table:

Description	Specifications
Model	Acer Aspire F (F5-573G)
Processor	Intel Core i5-7200U
Operating System	Window 10
Graphic	NVIDIA GeForce GTX 950M (4GB DDR3)
Memory	20GB DDR4 RAM
Storage	128GB SSD + 1TB HDD

Table 3.2.1a: Specifications of Laptop

Description	Specifications
Model	Honor X8 5G
Processor	Octa-core (2x2.2 GHz Kryo 460 & 6x1.9 GHz Kryo 460)
Chipset	Qualcomm SM4350-AC Snapdragon 480+ 5G (8 nm)
Operating System	Android 11, Magic UI 4.2
Graphic	Adreno 619
Memory	128GB 6GB RAM

Table 3.2.1b: Specifications of Android Phone

3.2.2 Software

a) Integrated Development Environment (IDE)

Android Studio, Google's official Integrated Development Environment (IDE) for Android app development, is an ideal choice for developers looking to create exceptional applications [31]. This IDE simplifies the creation of Android applications by providing a comprehensive suite of built-in tools, libraries, and templates. Developers can efficiently set up new projects, manage dependencies, and implement third-party libraries with minimal effort, allowing them to focus on developing the app's core features [31]. Moreover, Android Studio's real-time error detection and code suggestions help developers write clean, efficient code, resulting in faster development times and higher-quality applications [32].

On the other hand, Android Studio's drag-and-drop functionality greatly enhances the convenience and suitability of the IDE for mobile development [32]. The visual layout editor allows developers to create and modify app interfaces with ease by simply dragging and dropping UI elements onto the design canvas. This feature saves developers time and effort by eliminating the need to write complex XML code, making it more accessible for those with limited programming experience. Additionally, the drag-and-drop functionality ensures a more accurate representation of the final UI, reducing the likelihood of design errors and resulting in a better user experience.

Besides, Android Studio seamlessly integrates with Google Play services, enabling developers to access a wide range of APIs and services that enhance app functionality [32]. These services include maps, authentication, and cloud storage, among others. This integration simplifies the process of incorporating popular features into applications and helps developers create more engaging and feature-rich apps that users will appreciate.

b) Cloud Database

Firebase, a comprehensive platform offered by Google, delivers a wide array of tools and services aimed at simplifying mobile app development and ensuring the production of high-quality, scalable applications. Firebase's real-time database enables developers to construct apps that synchronize data across devices instantly, which can provide a smooth user experience [33]. Furthermore, Firestore, Firebase's cloud-based NoSQL database, offers adaptability, scalability, and offline data accessibility, making it the perfect choice for mobile applications that necessitate strong data management capabilities.

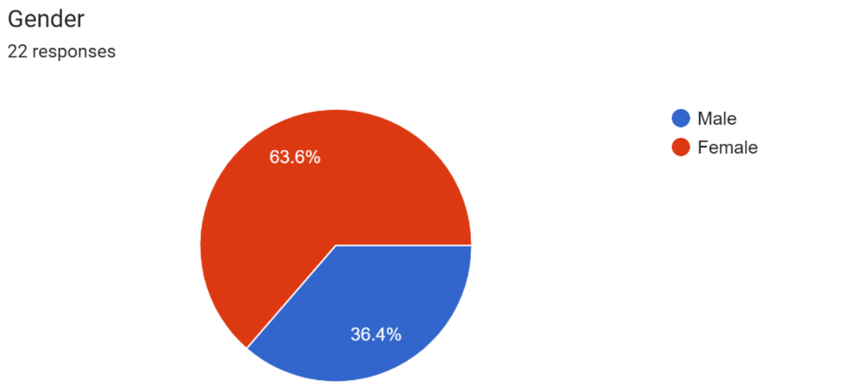
In addition, Firebase streamlines the authentication process by including a variety of pre-built authentication providers, such as Google, Facebook, Twitter, and email/password combinations [34]. This feature empowers developers to establish secure authentication systems without resorting to complicated server-side infrastructure. Moreover, Firebase's security rules facilitate granular access control, ensuring that user data remains safe and well-guarded.

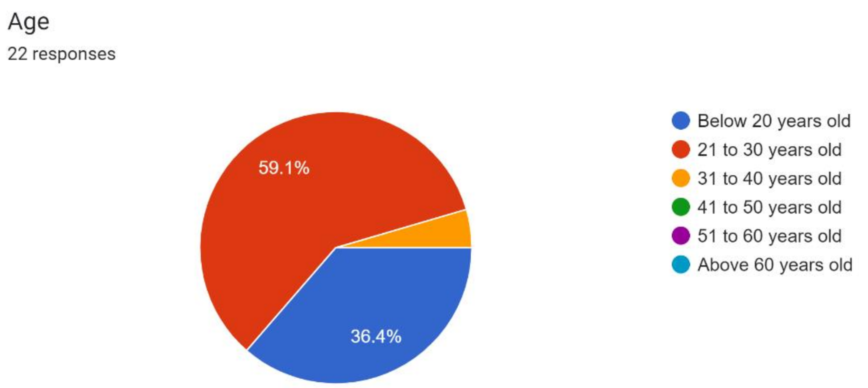
3.3 User Requirements

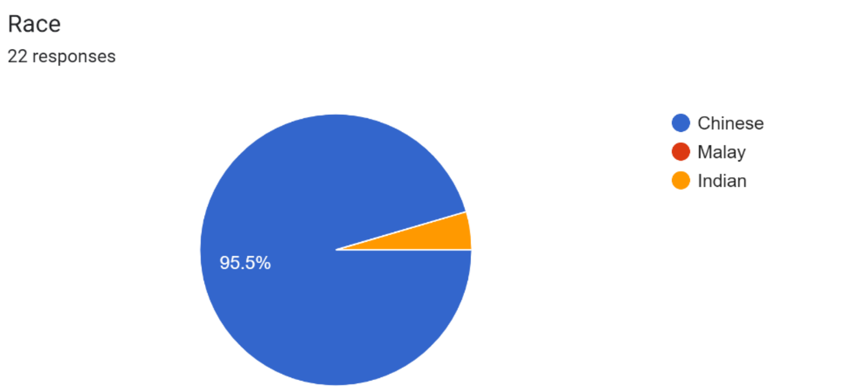
3.3.1 Analysis of Survey Result

The objective of this survey is to explore the potential of adding a donation feature to e-commerce platforms like Lazada and Shopee to address the issue of secondhand clothes remaining unsold in the e-marketplace for extended periods. This survey aims to gather feedback on the need for this system and the features that would make it user-friendly and efficient. This survey divided into 4 sessions which are “Session 1: Socio-demographic information”, “Session 2: Experience with secondhand clothes on e-commerce platforms”, “Session 3: Attitudes towards donating secondhand clothes on e-commerce platforms”, and “Session 4: Perceptions and expectations of a donation feature for secondhand clothes on e-commerce platforms”. A total of 22 respondents participated in this survey.

a) Session 1: Socio-demographic information

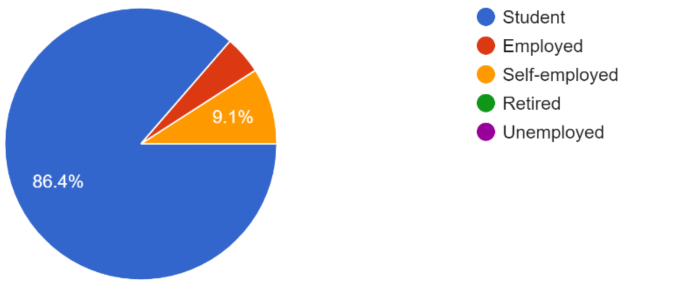






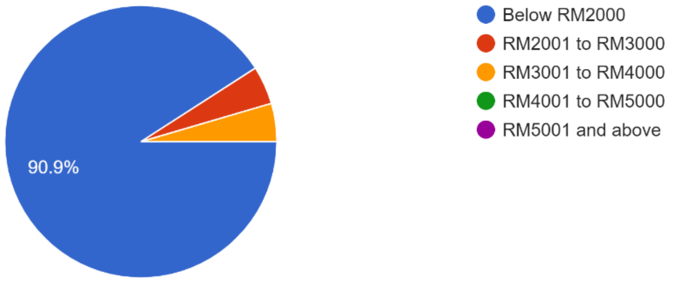
Occupation

22 responses



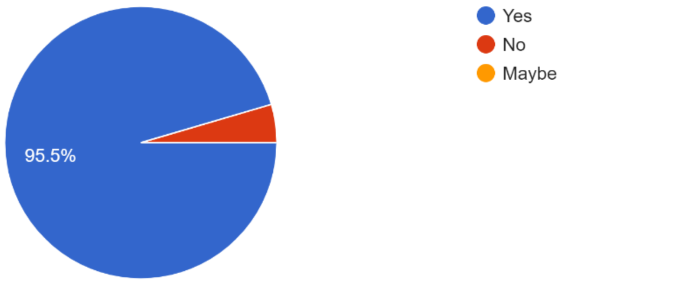
Monthly Income

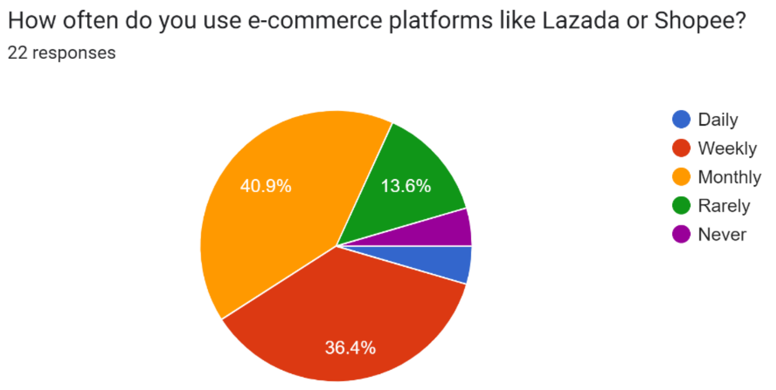
22 responses



Are you familiar with e-commerce platforms like Lazada or Shopee?

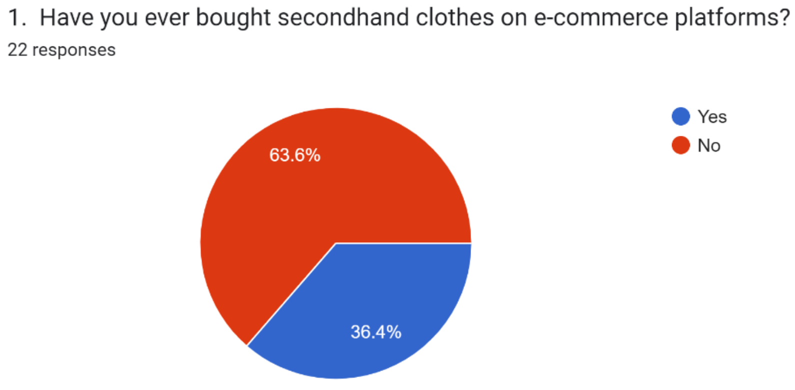
22 responses





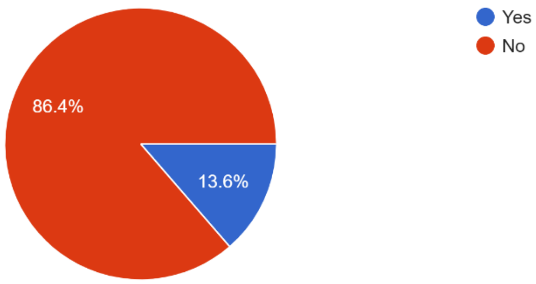
The majority of the respondents were female (63.6%), with 36.4% being male. The age group with the highest representation was 21 to 30 years old (59.1%), followed by those below 20 years old (36.4%), and 31 to 40 years old (4.5%). Most respondents were of Chinese ethnicity (95.5%), with a small percentage being Indian (4.5%). The majority were students (86.4%), with a few self-employed (9.1%) and employed (4.5%) respondents. Most respondents had a monthly income below RM2000 (90.9%), with a few earning between RM2001 to RM3000 (4.5%) and RM3001 to RM4000 (4.5%). Nearly all respondents were familiar with e-commerce platforms like Lazada and Shopee (95.5%).

b) <u>Session 2: Experience with secondhand clothes on e-commerce platforms</u>



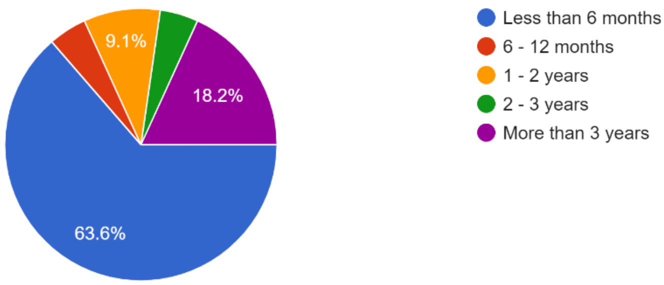
2. Have you ever sold secondhand clothes on e-commerce platforms?

22 responses



3. How long have you been using e-commerce platforms to buy or sell secondhand clothes?

22 responses



4. Have you ever had a negative experience buying or selling secondhand clothes on e-commerce platforms? If so, can you describe it?

22 responses

No

no

Clothes defect worse than expected

No,never try it before

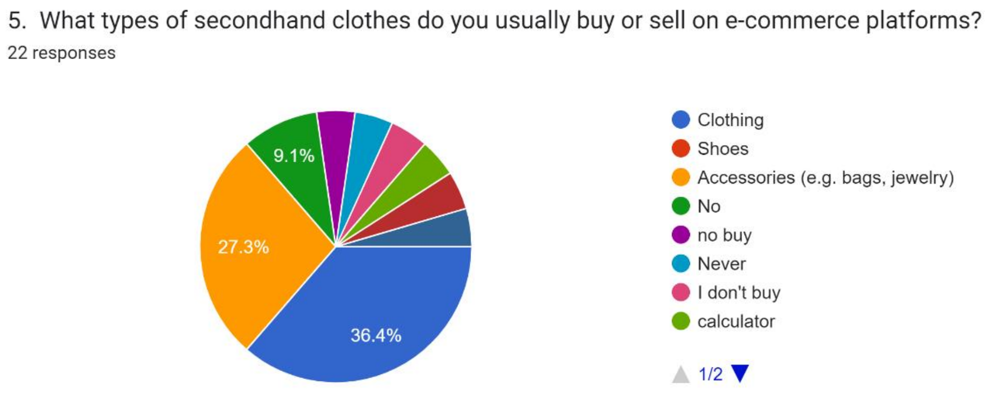
One time my dad bought some clothes for me and the material is so bad it is so thick and feel like suffocating when wearing it

Meet sellers that are not honest with the clothing condition

-

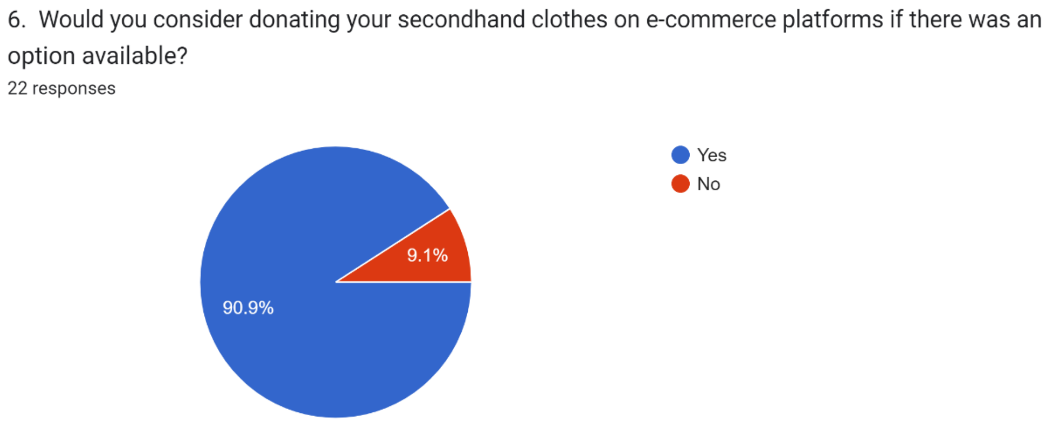
no experience

So far quite fair.

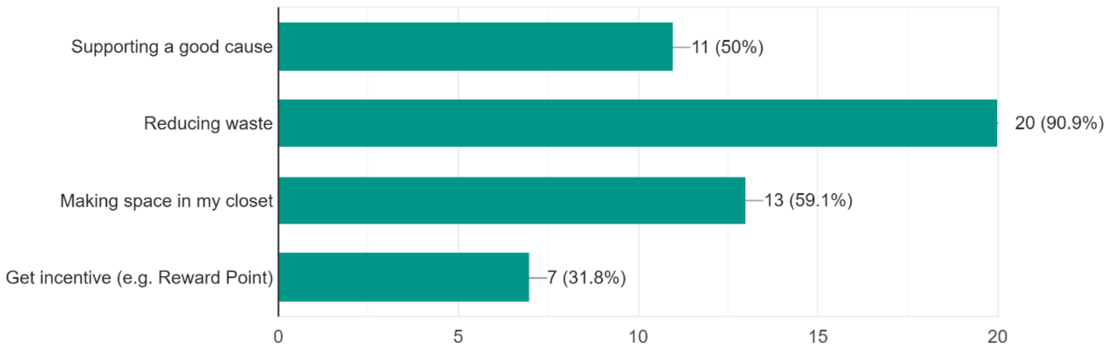


The respondents' usage frequency of e-commerce platforms like Lazada and Shopee varied, with 40.9% using them monthly, 36.4% weekly, 13.6% rarely, 4.5% daily, and 4.5% never. The majority of the respondents had not bought (63.6%) or sold (86.4%) secondhand clothes on e-commerce platforms. Most respondents had been using e-commerce platforms for buying or selling secondhand clothes for less than 6 months (63.6%). Negative experiences with buying or selling secondhand clothes were reported by some respondents, citing issues like poor clothing quality, dishonest sellers, and inaccurate product descriptions. The most common types of secondhand clothes purchased or sold on e-commerce platforms were clothing (36.4%) and accessories (27.3%).

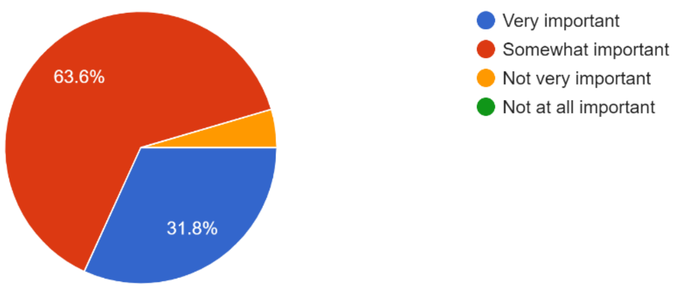
c) <u>**Session 3: Attitudes towards donating secondhand clothes on e-commerce platforms**</u>



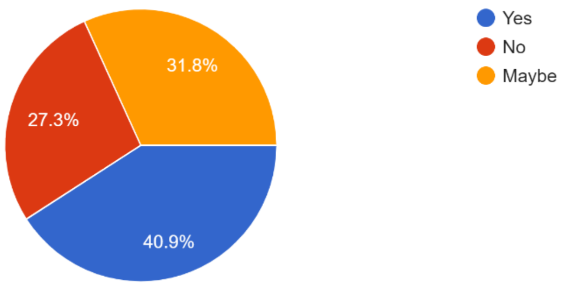
7. What would motivate you to donate your secondhand clothes on e-commerce platforms?
22 responses



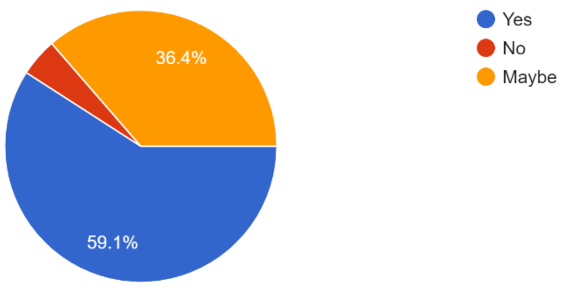
8. Would you be more likely to donate your secondhand clothes if you knew that they were going to a specific cause or organization?
22 responses



9. Would you be willing to pay a small fee (RM1 or 2) to donate your secondhand clothes on e-commerce platforms?
22 responses



10. Some secondhand clothes have been present on e-commerce platforms for over 5 years and are still unsold. Is it possible to solve this problem by implementing a donation system?
22 responses

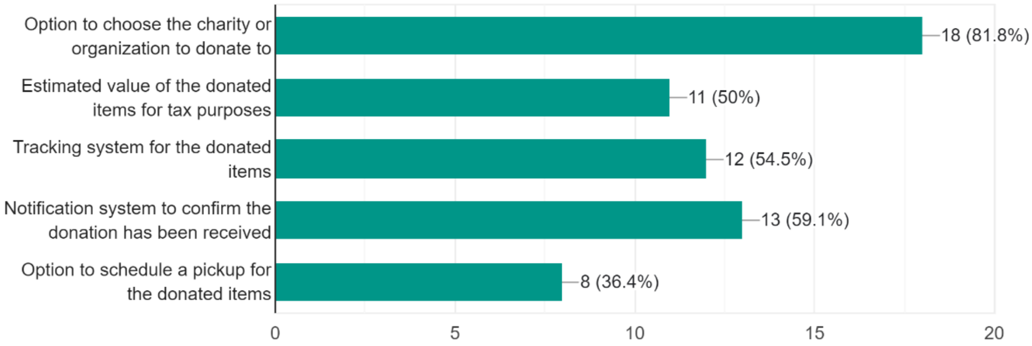


A significant majority of respondents (90.0%) expressed willingness to donate their secondhand clothes on e-commerce platforms if the option was available. The main motivations for donating secondhand clothes were reducing waste (90.9%), making space in their closet (59.1%), supporting a good cause (50%), and receiving incentives like reward points (31.8%). Most respondents felt that knowing their donations would go to a specific cause or organization was somewhat important (63.6%) or very important (31.8%). Opinions on paying a small fee (RM1 or 2) to donate secondhand clothes were mixed, with 40.9% agreeing to pay, 27.3% disagreeing, and 31.8% being unsure. When asked if implementing a donation system could solve the problem of secondhand clothes remaining unsold on e-commerce platforms for over five years, 59.1% of respondents believed it could, while 36.4% were unsure, and only 3.5% disagreed.

d) <u>Session 4: Perceptions and expectations of a donation feature for secondhand clothes on e-commerce platforms</u>

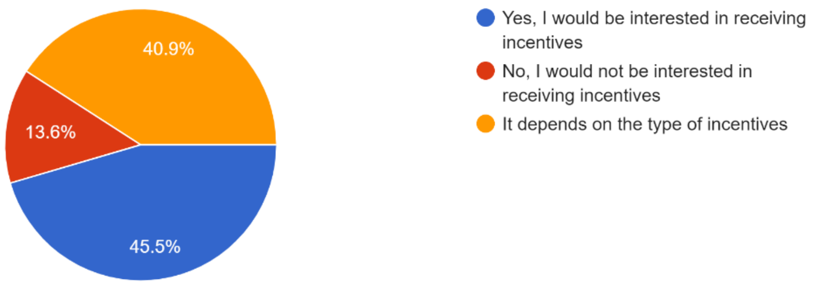
11. What features would you expect to see in a donation system for secondhand clothes on e-commerce platforms?

22 responses



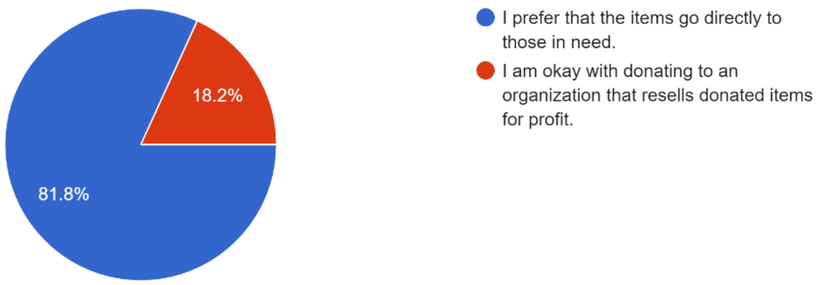
12. Would you be interested in receiving incentives for donating your secondhand clothes on e-commerce platforms?

22 responses



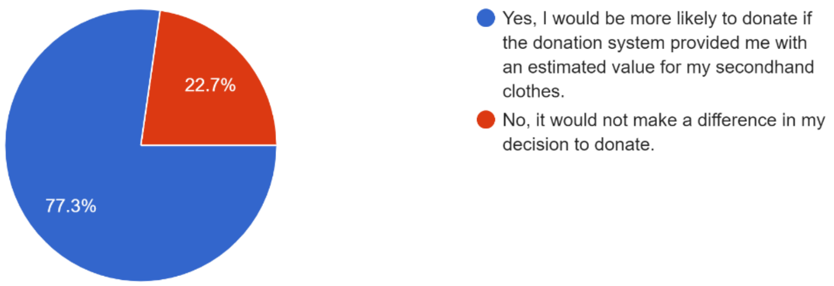
13. Would you be willing to donate to an organization that resells donated items for profit, or do you prefer that the items go directly to those in need?

22 responses

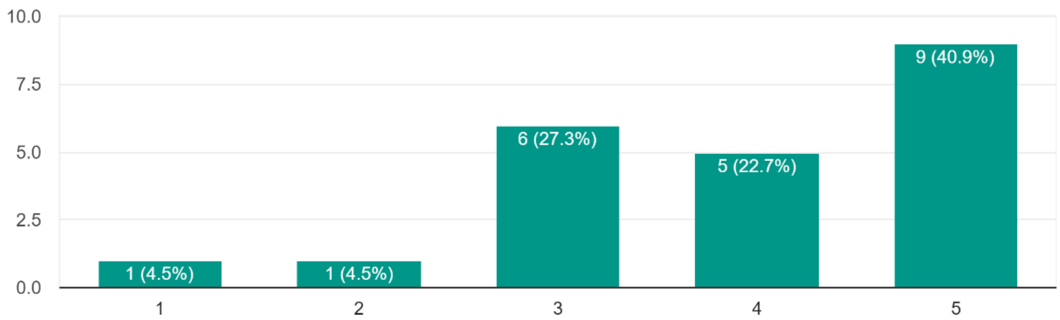


14. Would you be willing to share your donation history on social media to promote the cause and encourage others to donate?
22 responses

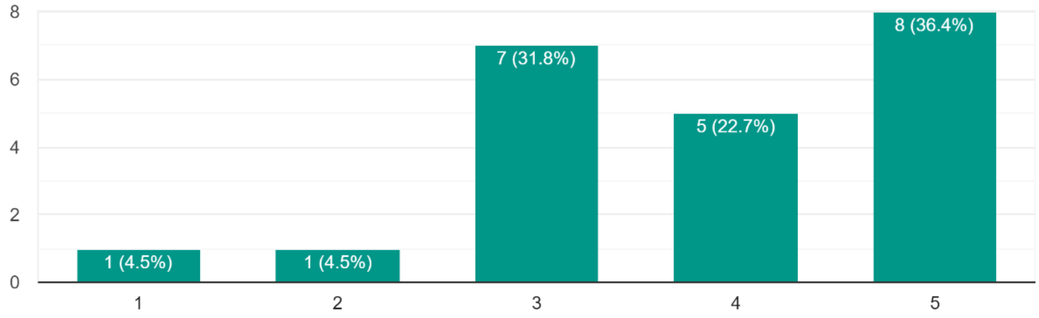
15. Would you be more likely to donate if the donation system provided you with an estimated value for your secondhand clothes?
22 responses



16. How important is it for the donation system to have a user rating or feedback system to rate the charities or organizations receiving the donations?
22 responses



17. How likely are you to recommend a donation system for secondhand clothes on e-commerce platforms to your friends and family?
22 responses



In terms of expected features in a donation system for secondhand clothes, respondents favored the option to choose the charity or organization to donate to (81.8%), a notification system to confirm the donation has been received (59.1%), a tracking system for the donated items (54.5%), an estimated value of the donated items for tax purposes (50%), and the option to schedule a pickup for the donated items (36.4%).

Regarding incentives for donating secondhand clothes on e-commerce platforms, 45.5% of respondents were interested in receiving incentives, 13.6% were not interested, and 40.9% said it would depend on the type of incentives. The majority of respondents (81.8%) preferred that their donated items go directly to those in need rather than donating to an organization that resells items for profit (18.2%).

When asked about sharing their donation history on social media, 54.5% of respondents were willing, while 45.5% were not comfortable with the idea. Most respondents (77.3%) stated they would be more likely to donate if the donation system provided an estimated value for their secondhand clothes, while 22.7% said it would not make a difference in their decision to donate.

The importance of a user rating or feedback system for rating the charities or organizations receiving donations was rated on a scale of 1 to 5, with 1 being not important and 5 being most important. Most respondents rated the importance as 5 (40.9%), followed by 3 (27.3%), 4 (22.7%), and 1 and 2 (both 4.5%). Lastly, the likelihood of respondents recommending a donation system for secondhand clothes on e-commerce platforms to their friends and family was also rated on a scale of 1 to 5, with the majority selecting 5 (36.4%), followed by 3 (31.8%), 4 (22.7%), and 1 and 2 (both 4.5%).

3.3.2 Summary of Survey Analysis

The survey results indicate a significant interest in a donation feature for secondhand clothes on e-commerce platforms among respondents. The majority expressed a willingness to donate their secondhand clothes and were motivated by various factors, including reducing waste, supporting a good cause, and making space in their closets. Key expectations for the donation system included the ability to choose the charity or organization to donate to, a tracking system, and a notification system to confirm that the donation has been received.

Respondents also valued incentives, with many being more likely to donate if the system provided an estimated value for their secondhand clothes. Furthermore, the importance of a user rating or feedback system for charities or organizations receiving donations was deemed crucial by most respondents. Overall, the survey findings suggest that implementing a donation feature for secondhand clothes on e-commerce platforms could potentially address the issue of unsold secondhand clothes in the e-marketplace while supporting social and environmental causes.

3.3.3 Recommended Features for the Proposed System

Based on the survey findings, the following recommendations can be made for implementing a donation feature for secondhand clothes on e-commerce platforms:

1. Design a user-friendly interface that allows users to easily donate their secondhand clothes, including options to choose the charity or organization to donate to, scheduling pickups for the donated items, and providing notifications and tracking systems for the donations.

2. Offer incentives to encourage users to donate, such as reward points or discounts on future purchases. Incentives should be tailored to the preferences of the target

audience, considering that many respondents were interested in receiving incentives or said their decision would depend on the type of incentives offered.

3. Provide transparency by giving users an estimated value of their donated items for tax purposes and ensuring that the donation process is transparent in terms of where the items are going and how they will be used.

4. Establish a user rating or feedback system for charities or organizations receiving donations, allowing users to make informed decisions about where to donate and promoting trust in the donation process.

5. Encourage social sharing of donation experiences to raise awareness of the cause and increase the visibility of the donation feature. This could be done by integrating social media sharing options within the donation process and offering incentives for users who share their donation history.

6. Collaborate with well-known charities or organizations to boost the credibility and appeal of the donation feature. Partnering with reputable organizations will not only enhance the user's trust in the system but also increase the likelihood of users donating their secondhand clothes.

7. Continuously monitor and evaluate the effectiveness of the donation feature after its implementation to identify areas for improvement and adapt to user feedback.

By incorporating these recommendations into the design and implementation of a donation feature for secondhand clothes on e-commerce platforms, it is more likely that the feature will address the issue of unsold secondhand clothes while also providing a positive user experience and supporting social and environmental causes.

3.4 Timeline

3.4.1 Gantt Chart

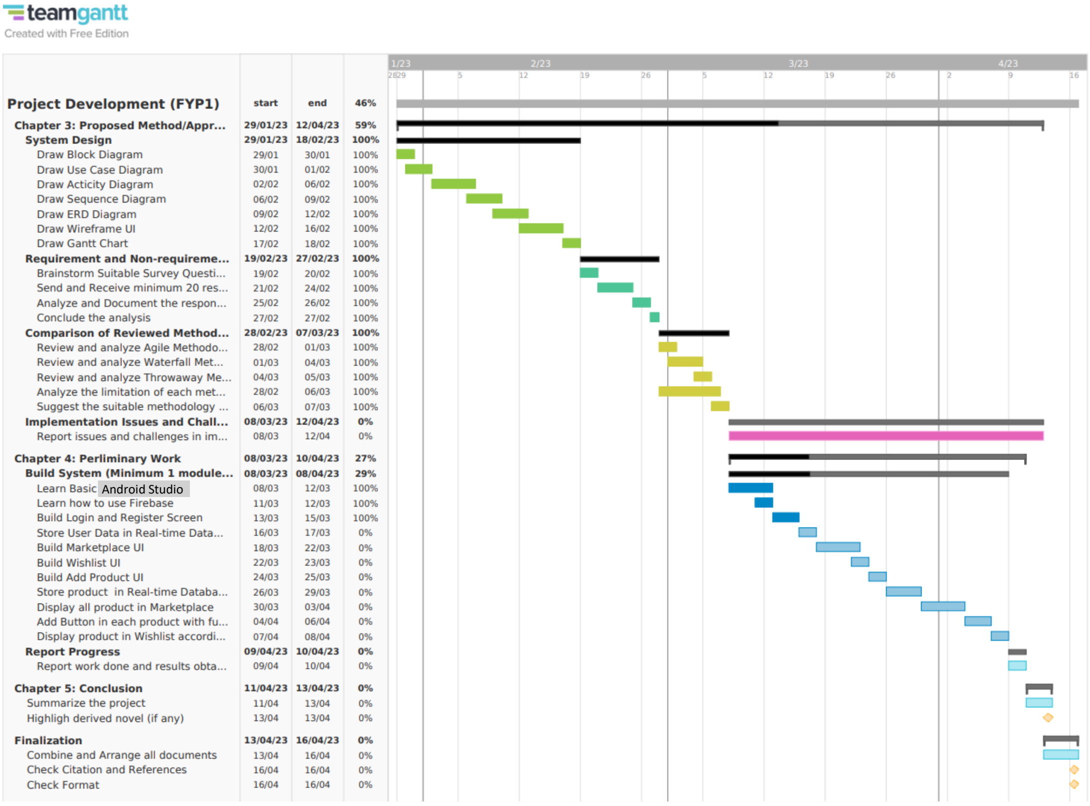


Figure 3.4.1a: Final Year Project 1 Gantt Chart

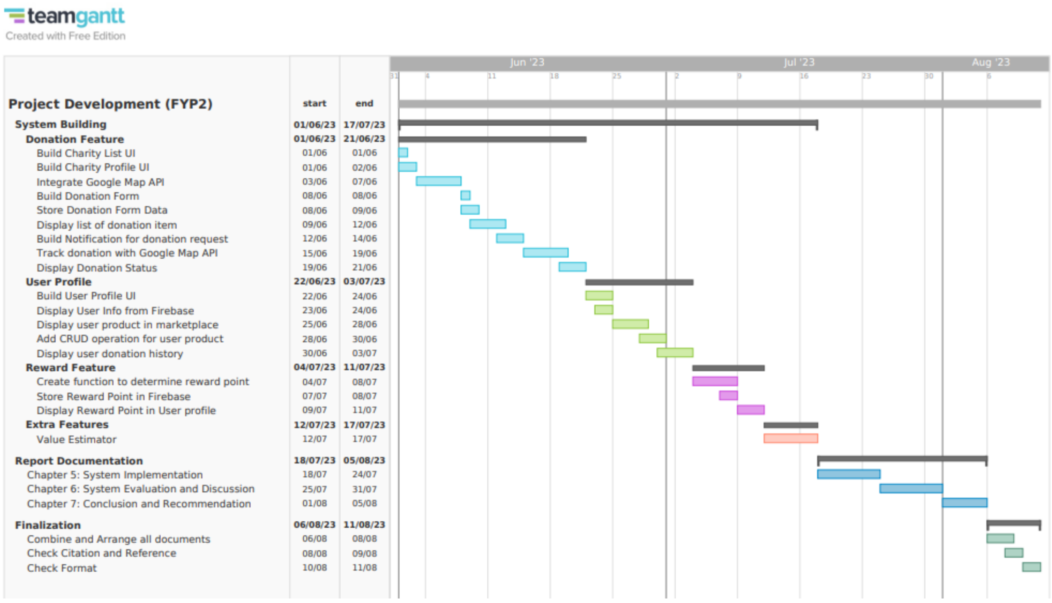


Figure 3.4.1b: Final Year Project 2 Gantt Chart

CHAPTER 4 System Design

4.1 System Block Diagram

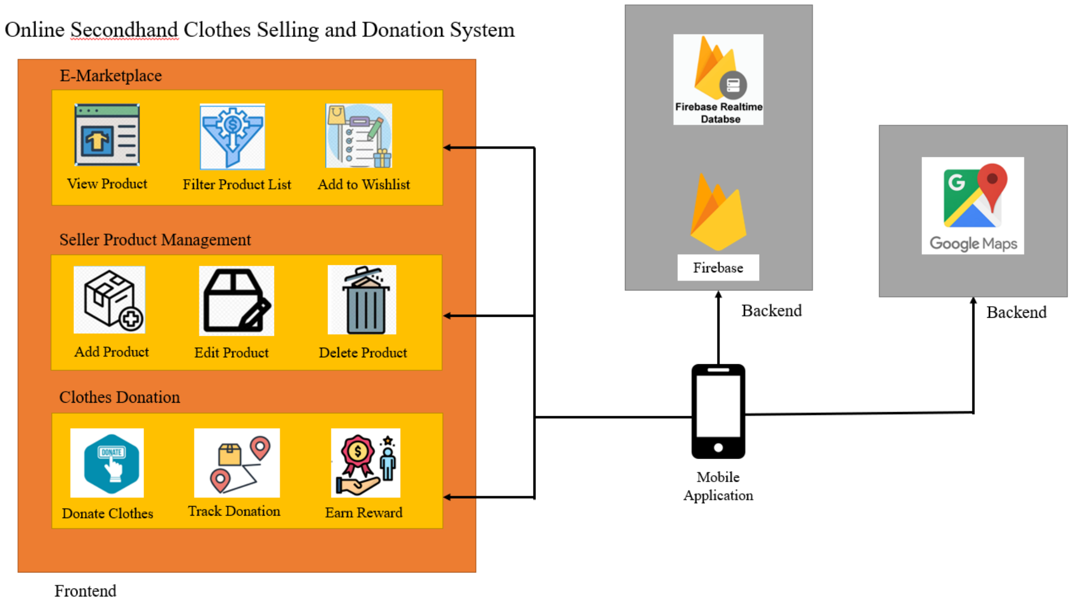


Figure 4.1a: Block Diagram

The block diagram presented above depicts a comprehensive secondhand clothing selling and donation system designed to provide users with a platform to browse, sell, and donate pre-owned garments. This system encourages sustainability and resource conservation by extending the lifecycle of clothing items, fostering a circular economy, and supporting charitable organizations.

The flow of the secondhand clothing system can be summarized as follows:

1. Users browse available secondhand clothing items through the User Interface, filtering or sorting items based on their preferences.
2. To sell an item, users create a listing in the Seller Management system, providing necessary information such as item details and images. Upon sale, the Seller Management system processes transactions and coordinates order fulfillment.
3. Users can choose to donate clothing items by selecting charity organization from database and add donation items in the Donation Management component.

By integrating with the Google Maps API, the system assists users in finding the nearest charity organization and provides real-time tracking of the donation's progress.

4. Charity organizations receive notifications of incoming donations and can accept or decline based on their needs. Once donations are received and processed, the system updates the donation status and records the transaction.

A unique aspect of this proposed system is the seamless integration of selling and donating functionalities, enabling users to participate in multiple forms of resource conservation and charitable giving. The system also emphasizes ease of use and intuitive navigation to provide a positive user experience.

Some limitations of this proposed system may include potential scalability issues, a reliance on user-generated content for accurate item descriptions, and the need for robust fraud prevention mechanisms.

In conclusion, the block diagram provides a comprehensive view of a secondhand clothing selling and donation system that enables users to browse, sell, and donate pre-owned garments. By promoting sustainability and supporting charity organizations, this system demonstrates an innovative approach to the secondhand clothing market and its potential positive impact on the environment and local communities.

4.2 Use-case Diagram

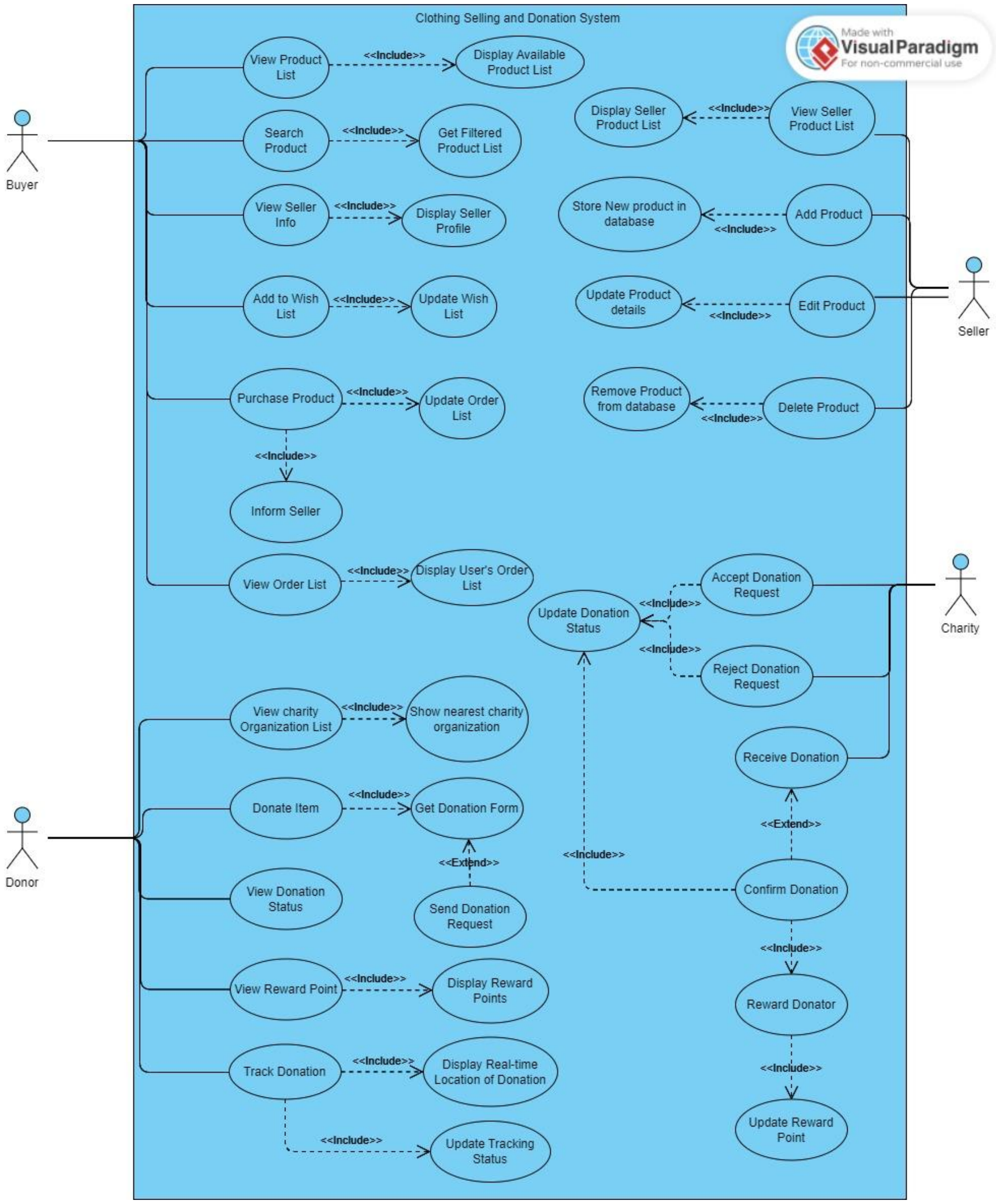


Figure 4.2a: Use-case Diagram

4.3 Activity Diagram

4.3.1 Shopping Activity Diagram

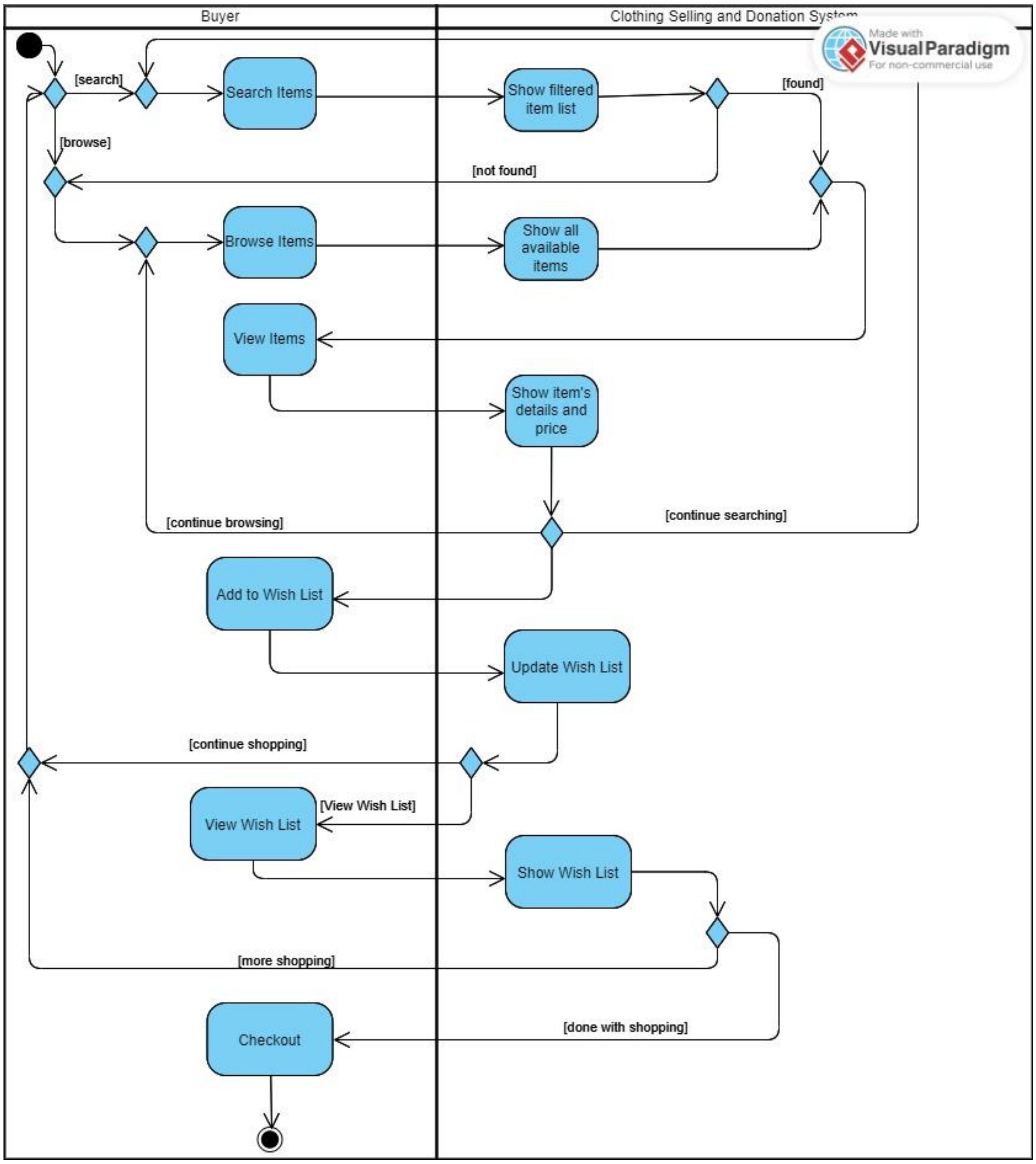


Figure 4.3a: Shopping Activity Diagram

The Activity diagram (refer to Figure 4.3a) represents the flow of control in shopping processing system, illustrating the main activities involved in processing customer add to Wishlist from product searching to final checkout.

First, a buyer enters the marketplace to search for or browse items. If the buyer opts to search for an item, the system displays a filtered list of items that match the buyer's input keywords. If the desired item is not found, the buyer continues browsing, and the system shows all available items. When the buyer finds an item of interest, they click on it, and the system presents the item details and price. If the item matches the buyer's expectations, it can be added to their Wishlist, with the system updating the Wishlist accordingly. However, if the item does not meet the buyer's requirements, the search or browsing process continues. Once an item has been added to the Wishlist, the buyer can view it by clicking on the "Wishlist" option, and the system shows the list of saved items to the buyer. At this point, the buyer can decide whether to continue shopping or proceed to checkout. If the buyer wishes to keep shopping, the flow returns to the initial decision node, where they can search for or browse items again. If the buyer is finished shopping, the flow concludes with the "Checkout" final state.

4.3.2 Sell Product Activity Diagram

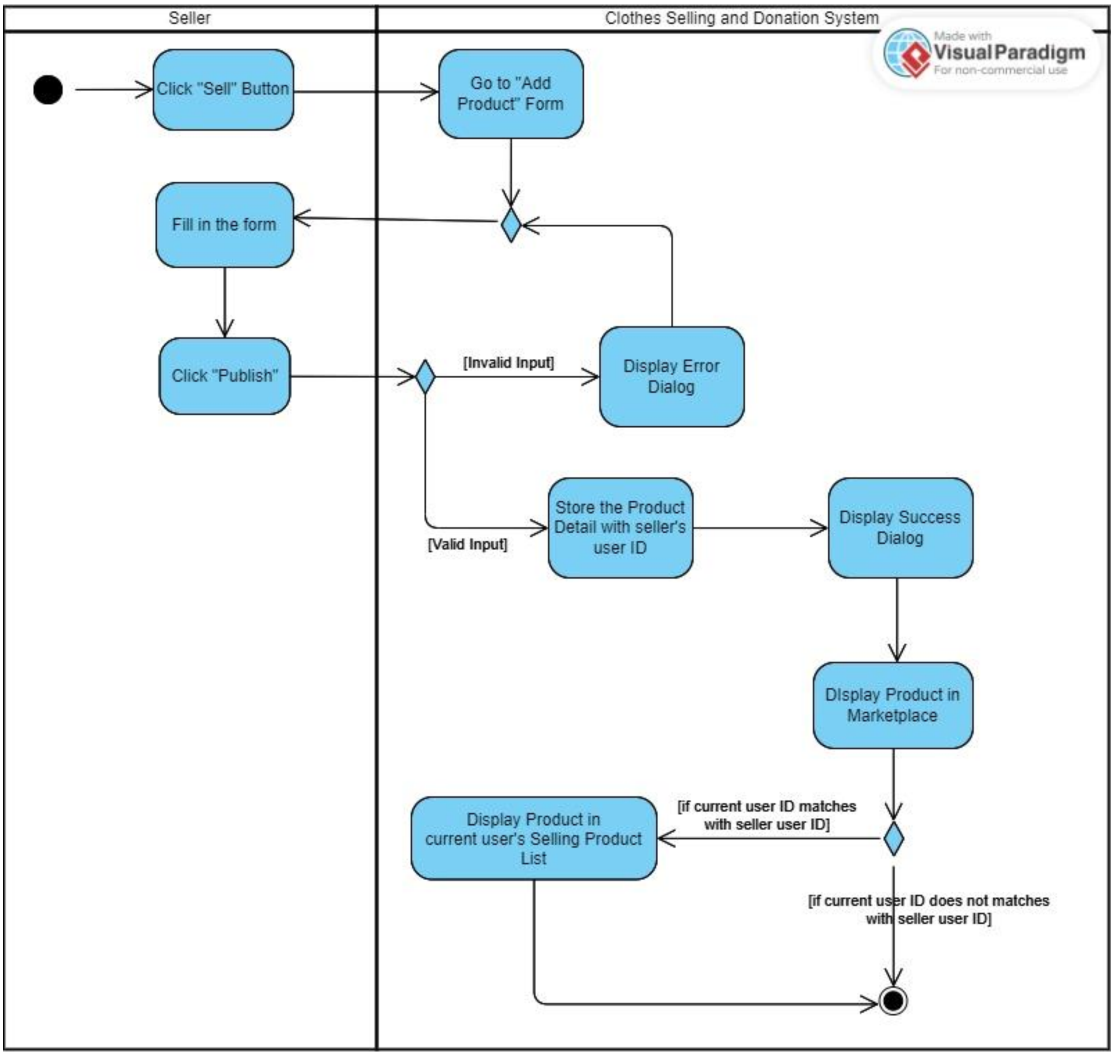


Figure 4.3b: Sell Product Activity Diagram

The Activity diagram (refer to Figure 4.3b) represents the flow of control in publishing a product to the marketplace. The process begins when a user decides to list an item for sale on the platform. The user first clicks on “Sell” button, the system will display a “Add Product” form. User need to provide the necessary information about the product, such as product name, description, price, category, and image.

If the seller is satisfied with the product information, they can proceed to publish the item in the marketplace. The system then validates the entered information, ensuring that it meets the platform's requirements and guidelines. If the product information is valid and adheres to the guidelines, the system stores the product details with the user id and makes it available for buyers to view, search, and purchase in the marketplace. A confirmation message is displayed to the seller, indicating that their item has been successfully published. After successfully published a product to marketplace, if the current user ID matched with the seller ID, the system will displays the product in the user’s Selling Product List.

However, if the product information is incomplete or does not meet the platform's requirements, the seller will be prompted to correct the errors or provide additional information. The seller can then update the product information and attempt to publish it again. The process continues until the item is successfully published and visible to buyers in the marketplace.

4.3.3 Earn Reward Points Activity Diagram

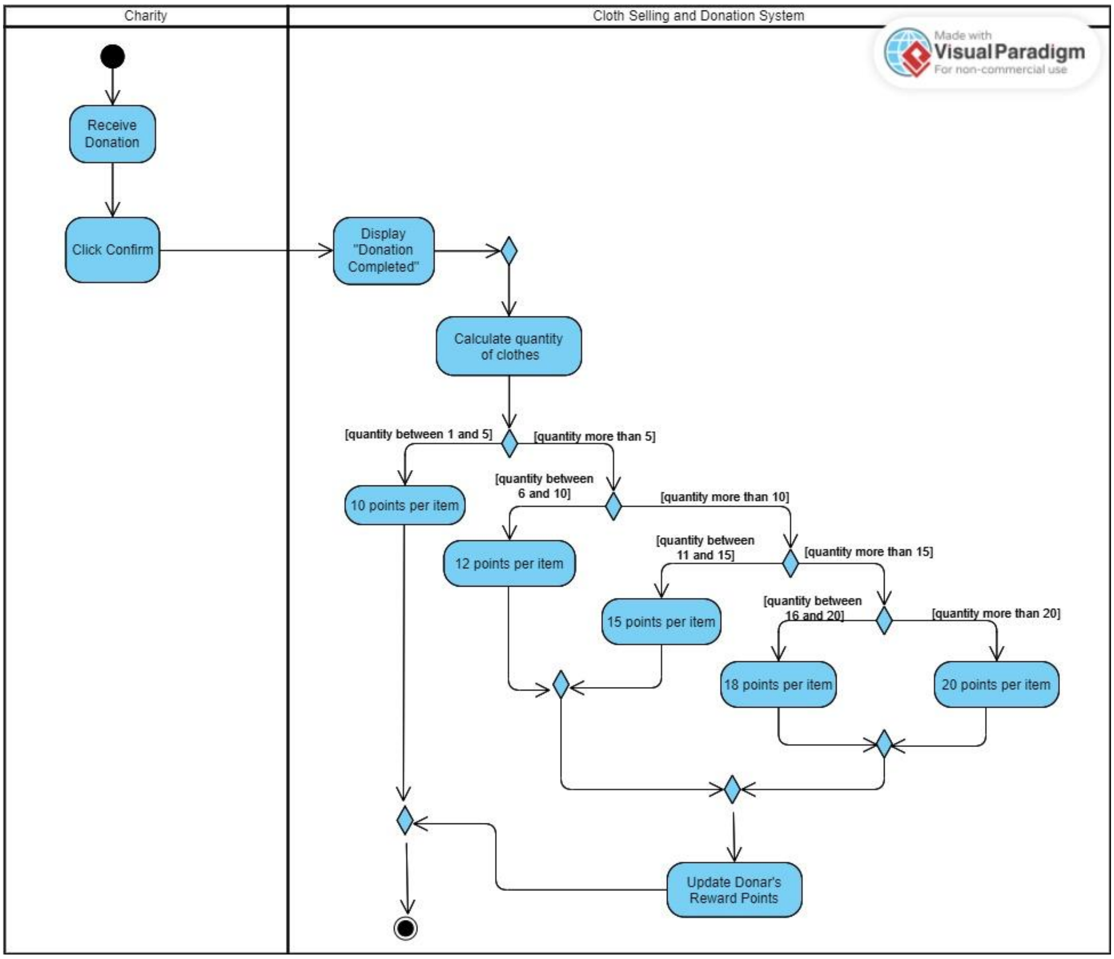


Figure 4.3c: Earn Reward Points Activity Diagram

The Activity diagram above (refer to Figure 4.3c) represents how the system calculate the reward points based on quantity of donation items. After the charity received the donation, they can click "Confirm" to indicate they have received the donation. The system will display "Donation Completed", then start calculate the reward points based on the donation item.

The calculation adapts the tier-based system for the reward points based on the specified ranges:

1. For quantity between 1 and 5: 10 points per item
2. For quantity between 6 and 10: 12 points per item
3. For quantity between 11 and 15: 15 points per item
4. For quantity between 16 and 20: 18 points per item
5. For quantity more than 20: 20 points per item

With this revised tiered approach, users who donate fewer items will still receive a considerable number of reward points, incentivizing them to participate in the donation program.

4.3.4 Donate Item Activity Diagram

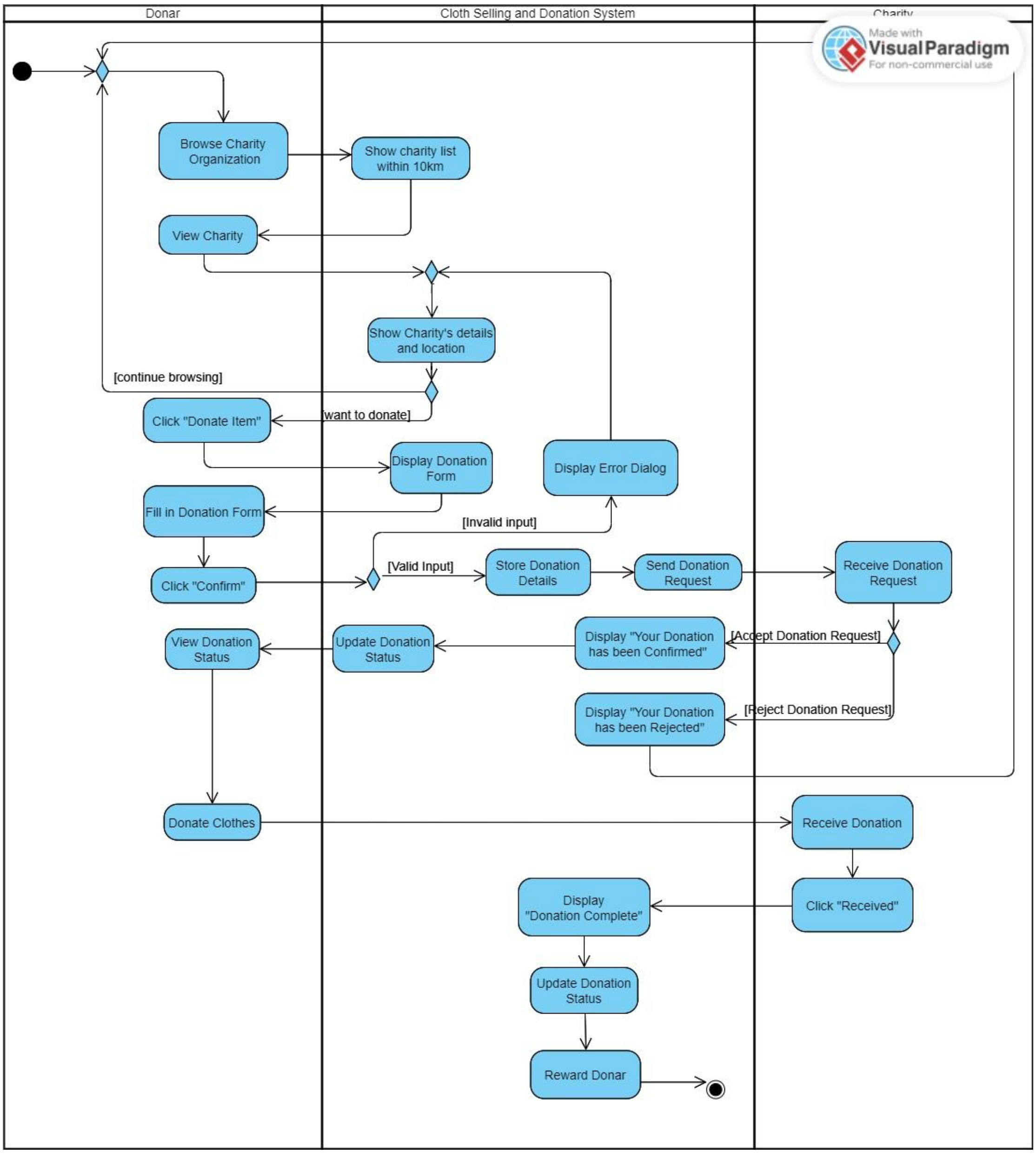


Figure 4.3d: Donate Item Activity Diagram

The Activity diagram (refer to Figure 4.3d) illustrates the process of donating items to a charity organization within a 10 km distance. Initially, a user browses the list of charity organizations, and the system displays all organizations within the specified range. The user can click on a particular organization to view its details and location.

If the user decides to donate to an organization, they click on the "Donate Item" button, which prompts the system to display a donation form. Once the user fills in the required information and clicks "Confirm," the system validates the input. If any input is invalid, the system displays an error message and the flow returns to the "Show Charity's details and location" activity.

If the input is valid, the system stores the donation details and sends a request with the relevant information to the chosen charity organization. Upon receiving the request, the organization reviews the details and decides whether to accept or reject the donation. If rejected, the system displays "Your Donation has been rejected," and the flow returns to the "Browse Charity Organization" activity.

However, if the organization accepts the request, the system displays "Your Donation has been Confirmed" and updates the donation status to "Confirmed." The user can then check the status, prepare the donation, and deliver it to the organization. Once the organization receives the donation, they can click "Received." Subsequently, the system displays "Donation Completed" and updates the donation status to "Completed." Finally, the system rewards the donor for their contribution.

4.4 Sequence Diagram

4.4.1 Sell Product Sequence Diagram

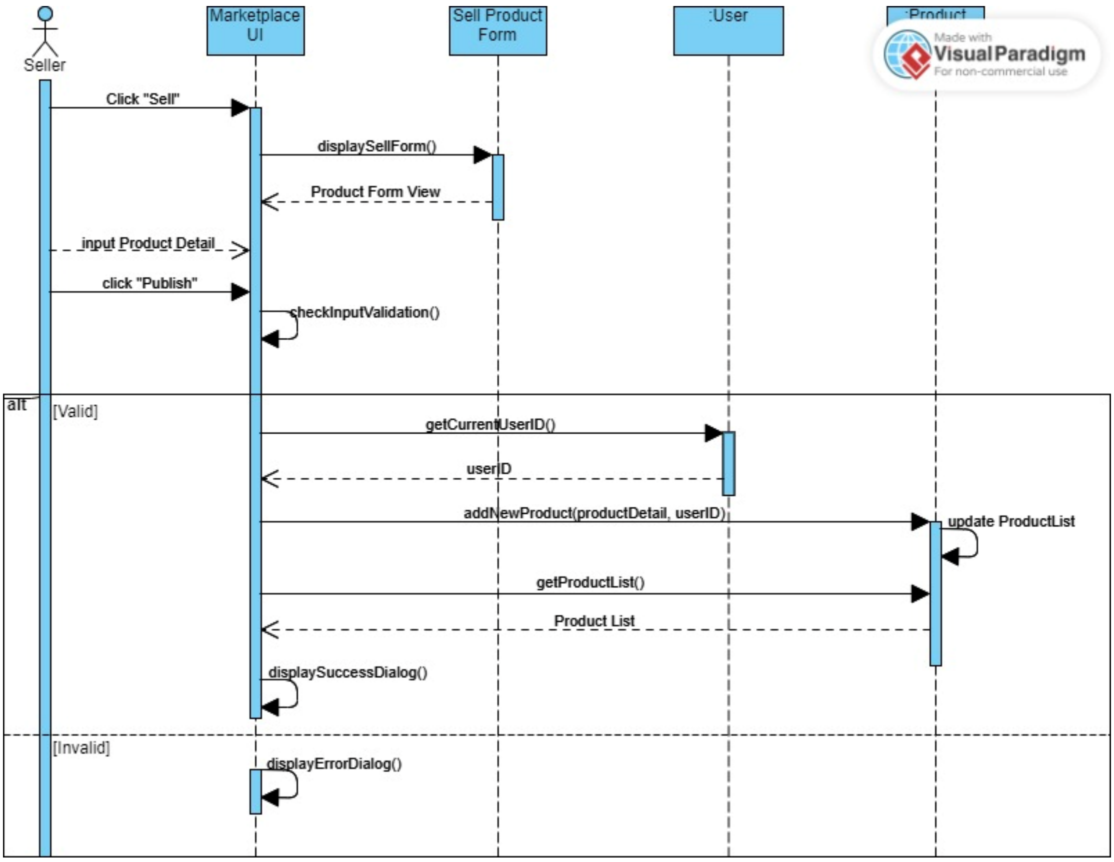


Figure 4.4a: Sell Product Sequence Diagram

The sequence diagram (refer to Figure 4.4a) illustrates the sequence of messages and actions involved in the product selling process.

Initially, the user clicks on "Sell" in the Marketplace UI, prompting the interface to execute displaySellForm() and display the "Sell Product Form." The user enters the required product details and clicks "Publish," which triggers the interface to run checkInputValidation() to ensure all necessary information has been entered correctly.

If the input is invalid, the system presents an error dialog. However, if the input is valid, the system proceeds to execute getCurrentUserID() from the user table, and the database retrieves the current user's userID. Next, the system carries out addNewProduct(productDetail, userID), which stores the product details and seller's userID in the Product table. To display the most recent product list in the marketplace, the system employs getProductList() to fetch the updated product list from the product table. Upon completion of these steps, the system displays a success dialog, signaling the end of the process.

4.4.2 Search Product Sequence Diagram

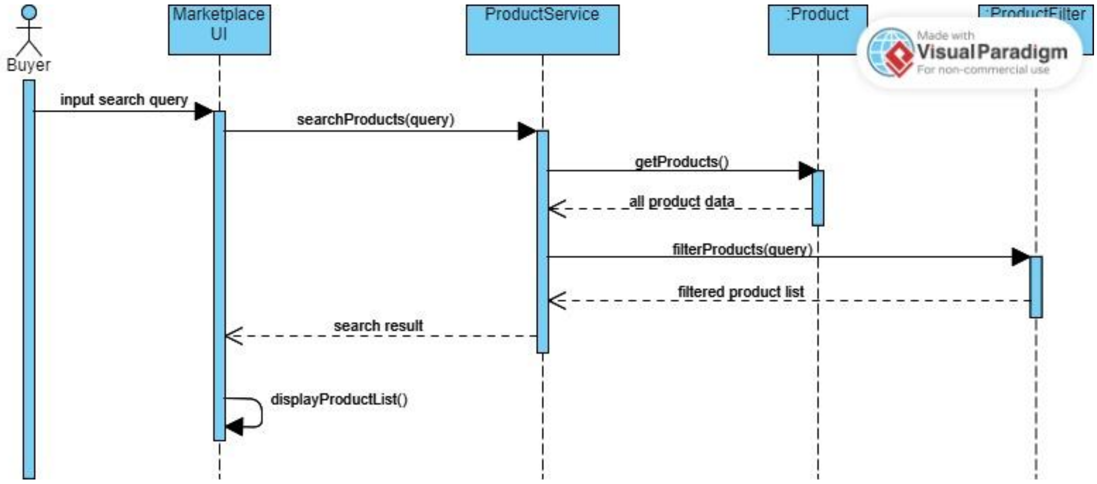


Figure 4.4b: Search Product Sequence Diagram

The sequence diagram (refer to Figure 4.4b) represents the flow of messages and actions in the product search process within the Marketplace UI.

Initially, the buyer inputs a search query in the Marketplace UI. This action prompts the Marketplace UI to send a searchProducts(query) request to the ProductService. Upon receiving the request, the ProductService interacts with the Product entity by calling getProduct() to retrieve all product data. The Product entity then returns the full product data to the ProductService.

Next, the ProductService forwards the search query to the ProductFilter component by executing filterProducts(query). The ProductFilter processes the query and filters the product data accordingly. Once the filtering is complete, the ProductFilter returns the filtered product list to the ProductService.

Finally, the ProductService sends the search results back to the Marketplace UI, which then displays the filtered product list to the buyer. This sequence diagram illustrates the end-to-end process of searching for and displaying products based on a buyer's input query in the Marketplace UI.

4.4.3 Add to Wishlist Sequence Diagram

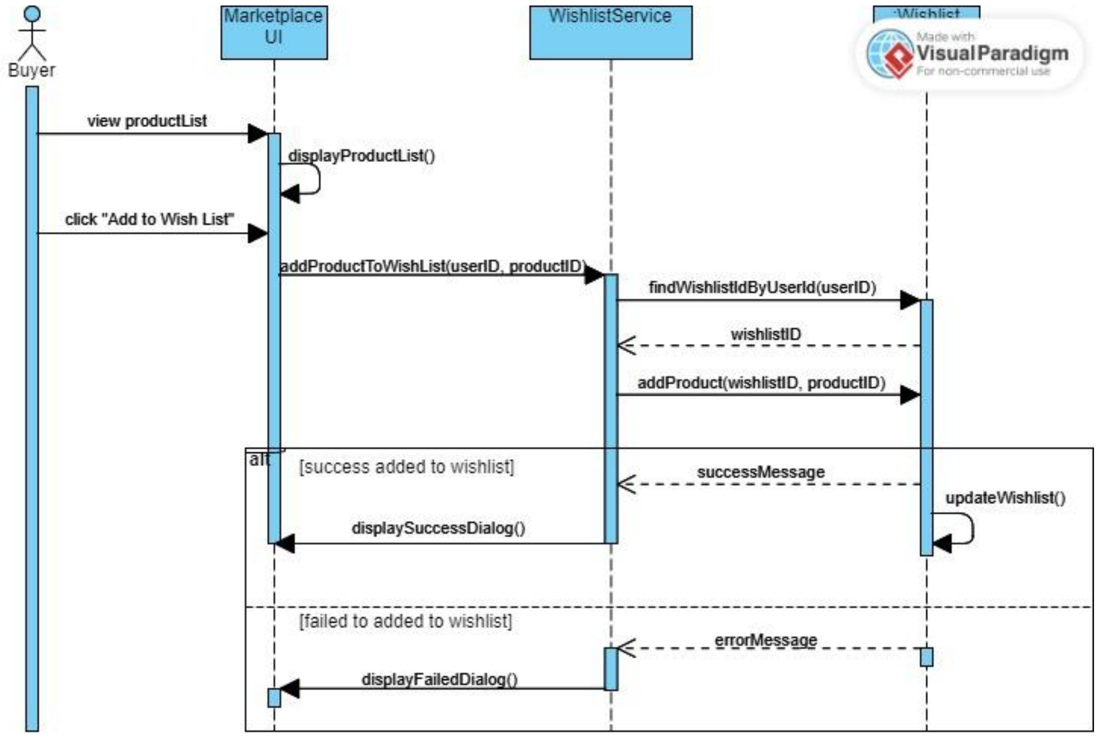


Figure 4.4c: Add to Wishlist Sequence Diagram

The sequence diagram (refer to Figure 4.4c) represents the flow of messages and actions in the process of adding a product to a user's wishlist within the Marketplace UI.

Initially, the buyer views the product list in the Marketplace UI, and the displayProductList() function is called to show the products. The buyer then clicks on the "Add to Wishlist" button for a specific product, prompting the Marketplace UI to send a request to the WishlistService with the addProductToWishlist(userID, productID) method.

The WishlistService communicates with the Wishlist entity by calling findWishlistByUserId(userID) to locate the appropriate wishlist based on the user's ID. The Wishlist entity returns the wishlistID to the WishlistService, which then requests to add the product to the wishlist by calling addProduct(wishlistID, productID).

If the product is successfully added to the wishlist, the Wishlist entity sends a successMessage back to the WishlistService. The Wishlist entity also updates the wishlist using the updateWishlist() function. The WishlistService then informs the Marketplace UI of the successful addition, triggering the displaySuccessDialog() function to show a success dialog to the buyer.

If the product addition fails, the Wishlist entity sends an errorMessage to the WishlistService. In response, the WishlistService communicates with the Marketplace UI, calling the displayErrorDialog() function to show an error dialog to the buyer. This sequence diagram demonstrates the end-to-end process of adding a product to a user's wishlist and displaying the appropriate feedback within the Marketplace UI.

4.4.4 Remove Product Sequence Diagram

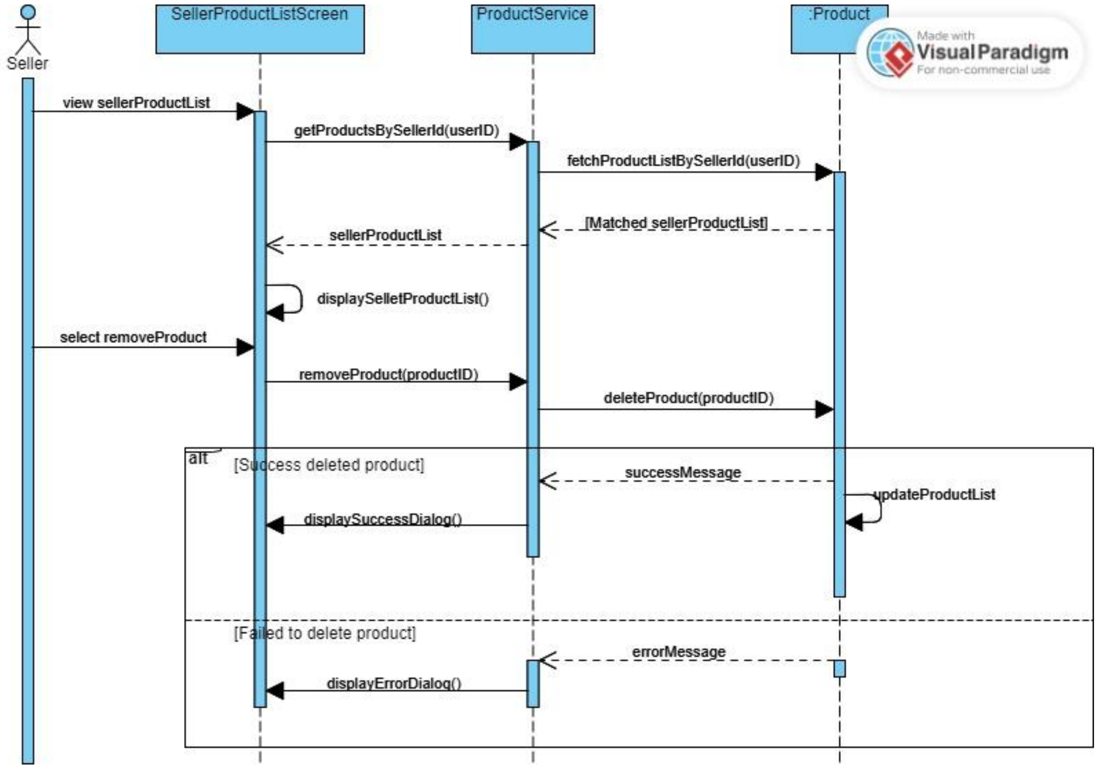


Figure 4.4d: Remove Product Sequence Diagram

The sequence diagram (refer to Figure 4.4d) represents the flow of messages and actions in the process of a seller removing a product from their product list within the SellerProductListScreen UI.

First, the seller views their product list by accessing the SellerProductListScreen, which then sends a request to the ProductService using the getProductsBySellerId(userID) method. The ProductService communicates with the Product entity by calling fetchProductListBySeller(userID) to retrieve all the products associated with the seller's ID. The Product entity returns the matched sellerProductList to the ProductService, which subsequently provides the list to the

SellerProductListScreen. The displaySellerProductList() function is called to show the seller's products.

The seller selects a product to remove and interacts with the SellerProductListScreen to initiate the removeProduct process. The SellerProductListScreen calls the ProductService's removeProduct(productID) method, which communicates with the Product entity to delete the product using the deleteProduct(productID) function.

If the product is successfully deleted, the Product entity sends a successMessage back to the ProductService. The Product entity also updates the product list using the updateProductList() function. The ProductService then informs the SellerProductListScreen of the successful deletion, triggering the displaySuccessDialog() function to show a success dialog to the seller.

If the product deletion fails, the Product entity sends an errorMessage to the ProductService. In response, the ProductService communicates with the SellerProductListScreen, calling the displayErrorDialog() function to show an error dialog to the seller. This sequence diagram demonstrates the end-to-end process of removing a product from a seller's product list and displaying the appropriate feedback within the SellerProductListScreen UI.

4.4.5 Show Charity Organization within 10km Sequence Diagram

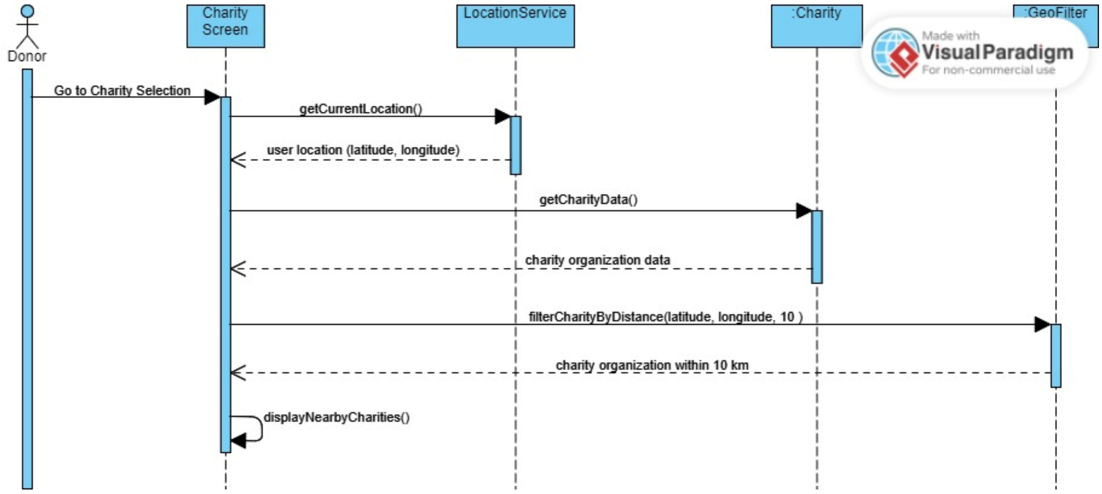


Figure 4.4e: Show Charity Organization (within 10km) Sequence Diagram

The sequence diagram (refer to Figure 4.4e) represents the flow of messages and actions involved in displaying charity organizations within a 10km radius for a donor.

First, the donor navigates to the CharityScreen to initiate the process of charity selection. The CharityScreen then requests the donor's current location by calling the LocationService's getCurrentLocation() method. The LocationService returns the user's latitude and longitude to the CharityScreen.

Next, the CharityScreen communicates with the CharityOrganization entity to fetch the charity data using the getCharityData() function. The CharityOrganization entity returns the charity organization data included the latitude and longitude to the CharityScreen.

The CharityScreen then utilizes the Geofilter's filterCharityByDistance(latitude, longitude, 10) method to filter the charity organizations within a 10km distance from the donor's location. The Geofilter processes this request and returns the list of charity organizations that fall within the specified range to the CharityScreen.

Finally, the CharityScreen calls the displayNearbyCharities() function to present the filtered list of nearby charity organizations to the donor. This sequence diagram demonstrates the end-to-end process of filtering and displaying charity organizations within a 10km radius of the donor's location in the CharityScreen UI.

4.4.6 Donate Item Sequence Diagram

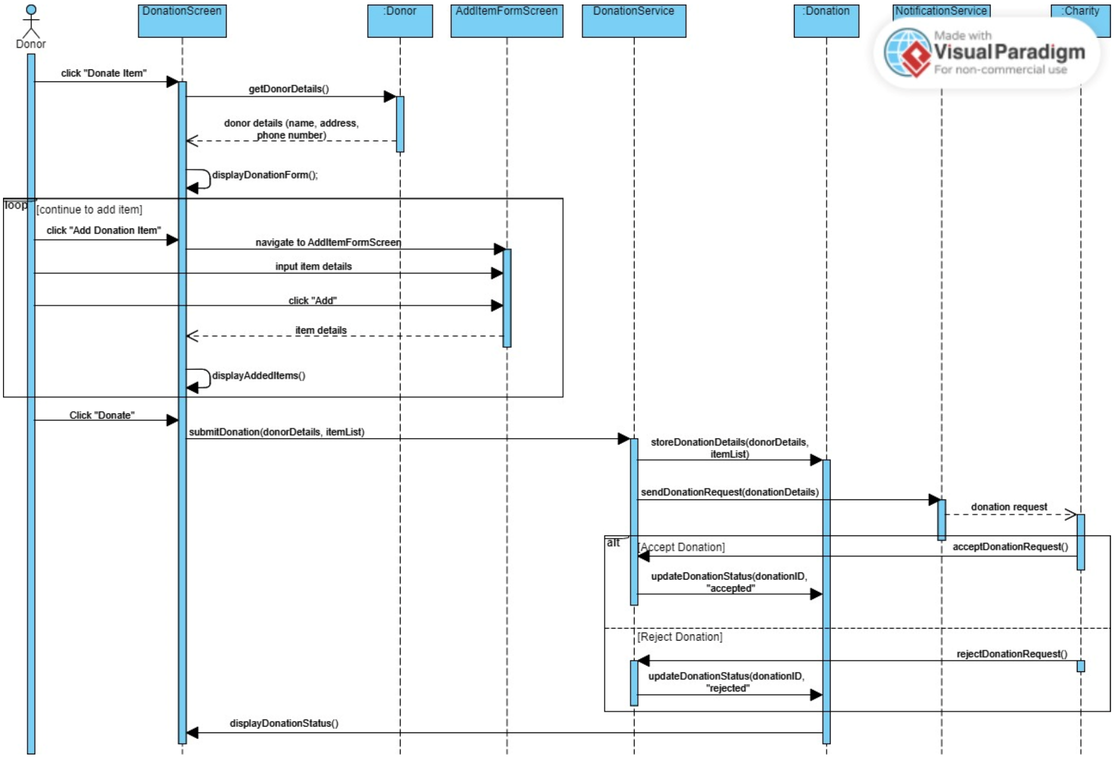


Figure 4.4f: Donate Item Sequence Diagram

The sequence diagram (refer to Figure 4.4f) represents the flow of messages and actions involved in donating an item from the donor to the charity organization.

First, the donor clicks "Donate item" on the DonationScreen, which prompts the Donor entity to get the donor's details, such as their name, address, and phone number. The Donor entity returns these details to the DonationScreen, which then displays the donation form.

In a loop, the donor adds donation items by clicking "Add Donation Item" on the DonationScreen. The screen navigates to the AddItemFormScreen, where the donor inputs the item details and clicks "Add." The AddItemFormScreen returns the item details to the DonationScreen, which displays the added items. This loop continues until the donor no longer wishes to add any more items.

After exiting the loop, the donor clicks "Donate" on the DonationScreen. The DonationScreen sends the donor details and item list to the DonationService using the submitDonationDetails() method. The DonationService stores these details in the

Donation entity and sends a donation request to the NotificationService, which forwards it to the charity.

If the charity accepts the donation request, they notify the DonationService, which updates the donation status to "accepted" in the Donation entity. If the charity rejects the request, the DonationService is also notified and updates the status to "rejected."

Finally, the Donation entity communicates the updated donation status to the DonationScreen, which displays the status to the donor. This sequence diagram demonstrates the end-to-end process of a donor donating items to a charity organization and receiving feedback on the donation request's acceptance or rejection.

4.4.7 Track Donation Realtime Location Sequence Diagram

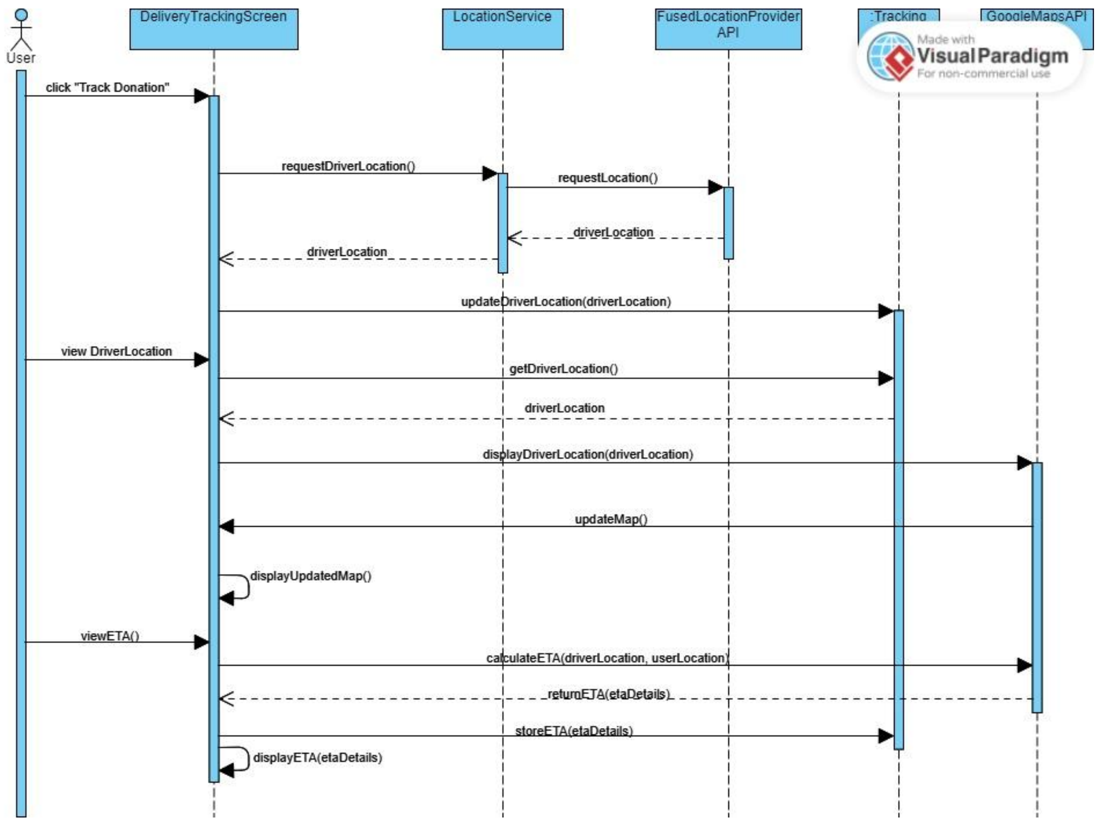


Figure 4.4g: Track Donation Realtime Location Sequence Diagram

The sequence diagram (refer to Figure 4.4g) represents the flow of messages and actions involved in tracking the real-time location of a donation being delivered.

First, the user clicks "Track Donation" on the DeliveryTrackingScreen. The screen then requests the driver's location from the LocationService. The LocationService, in turn, requests the driver's location from the FusedLocationProviderAPI, which provides the driver's location back to the LocationService. The LocationService then returns the driver's location to the DeliveryTrackingScreen, which updates the driver's location in the Tracking entity.

Next, the user views the driver's location on the DeliveryTrackingScreen. The screen requests the driver's location from the Tracking entity, which returns the driver's location to the DeliveryTrackingScreen. The screen then communicates with the GoogleMapsAPI to display the driver's location on a map. The GoogleMapsAPI updates the map accordingly, and the DeliveryTrackingScreen displays the updated map to the user.

Finally, the user views the estimated time of arrival (ETA) for the donation on the DeliveryTrackingScreen. The screen requests the ETA from the GoogleMapsAPI by providing the driver's location and the user's location. The GoogleMapsAPI calculates the ETA and returns the details to the DeliveryTrackingScreen. The screen then stores the ETA details in the Tracking entity and displays the ETA information to the user. This sequence diagram demonstrates the real-time tracking of a donation's delivery, enabling the user to monitor the driver's location and ETA.

4.4.8 Add Reward Point Sequence Diagram

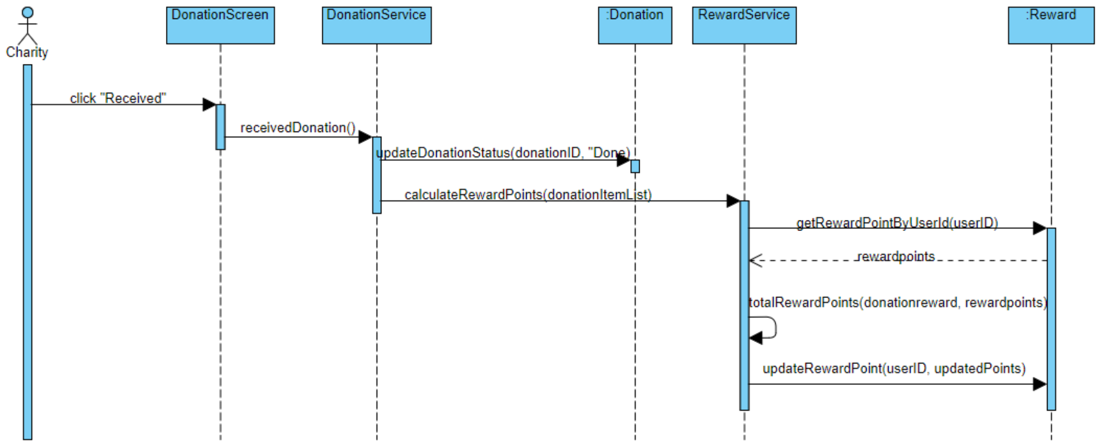


Figure 4.4h: Add Reward Points Sequence Diagram

The sequence diagram (refer to Figure 4.4h) represents the flow of messages and actions involved in adding reward points to a user's account upon the completion of a donation.

When the charity receives the donation, they click "Received" on the DonationScreen. The screen then communicates with the DonationService to mark the donation as received. The DonationService updates the donation status in the Donation entity by setting the donationID status to "Done."

Next, the DonationService requests the calculation of reward points from the RewardService based on the donated items. The RewardService retrieves the current reward points of the user from the Reward entity by calling getRewardPointByUserId(userID). The Reward entity returns the existing reward points to the RewardService.

The RewardService calculates the total reward points by adding the donation reward points to the existing reward points. It then updates the user's reward points in the Reward entity by calling updateRewardPoint(userID, updatedPoints).

This sequence diagram demonstrates the process of adding reward points to a user's account upon the successful completion of a donation, providing an incentive for users to continue donating items.

4.5 Entity Relationship Diagram (ERD)

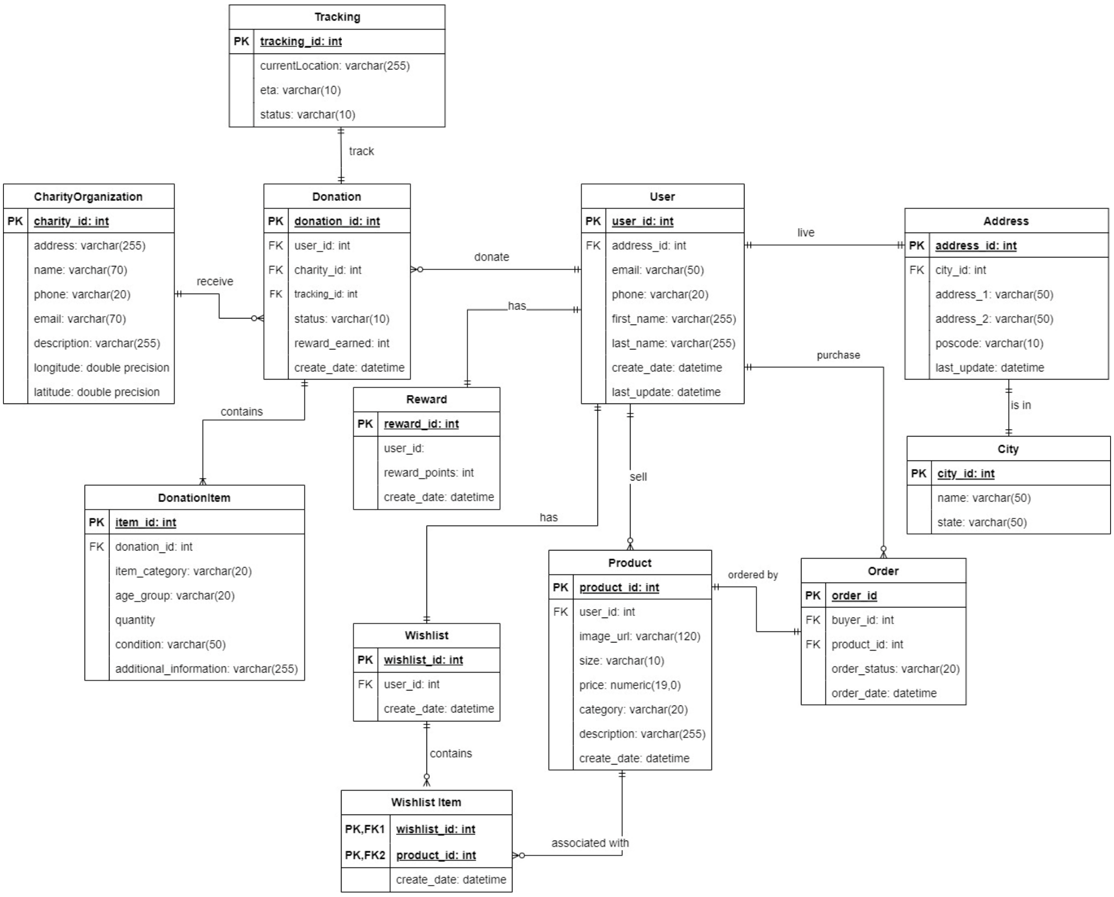


Figure 4.5a: Entity Relationship Diagram

4.5.1 Data Dictionary

i) User Table

Field Name	Data Type	Key	Description
user_id	int	Primary Key	Unique identifier for each user in the system
address_id	int	Foreign Key	Identifier for the user's address, referencing the address table
email	varchar(50)		User's email address, limited to 50 characters
phone	varchar(20)		User's phone number, limited to 20 characters

first_name	varchar(255)		User's first name, limited to 255 characters
last_name	varchar(255)		User's last name, limited to 255 characters
create_date	datetime		Date and time the user record was created
last_update	datetime		Date and time the user record was last updated

ii) Address Table

Field Name	Data Type	Key	Description
address_id	int	Primary Key	Unique identifier for each address in the system
city_id	int	Foreign Key	Identifier for the related city, referencing the City table
address_1	varchar(50)		Primary address line, limited to 50 characters
address_2	varchar(50)		Secondary address line (optional), limited to 50 characters
postcode	varchar(10)		Postal code for the address, limited to 10 characters

iii) City Table

Field Name	Data Type	Key	Description
city_id	int	Primary Key	Unique identifier for each city in the system
name	varchar(50)		Name of the city, limited to 50 characters
state	varchar(50)		Name of the state in which the city is located, limited to 50 characters

iv) Product Table

Field Name	Data Type	Key	Description
product_id	int	Primary Key	Unique identifier for each product in the system
user_id	int	Foreign Key	Identifier for the user who added the product, referencing the user table
image_url	varchar(120)		URL of the product image, limited to 120 characters
size	varchar(10)		Size of the product, limited to 10 characters
price	numeric(19,2)		Price of the product, with a precision of 19 digits and 2 decimal places
category	varchar(20)		Product's category, limited to 20 characters
description	varchar(255)		Brief description of the product, limited to 255 characters
create_date	datetime		Date and time the product record was created

v) Order Table

Field Name	Data Type	Key	Description
order_id	int	Primary Key	Unique identifier for each order in the system
user_id	int	Foreign Key	Identifier for the user who placed the order, referencing the User table
product_id	int	Foreign Key	Identifier for the ordered product, referencing the Product table
order_status	varchar(20)		Current status of the order, limited to 20 characters

order_date	datetime		Date and time the order was placed

vi) Wishlist Table

Field Name	Data Type	Key	Description
wishlist_id	int	Primary Key	Unique identifier for each wishlist in the system
user_id	int	Foreign Key	Identifier for the user who owns the wishlist, referencing the user table
create_date	datetime		Date and time the wishlist was created

vii) Wishlist Item Table

Field Name	Data Type	Key	Description
wishlist_id	int	Primary Key, Foreign Key	Unique identifier for the wishlist, referencing the wishlist table
product_id	int	Primary Key, Foreign Key	Unique identifier for the product in the wishlist, referencing the product table
create_date	datetime		Date and time the wishlist item was added

viii) Reward Table

Field Name	Data Type	Key	Description
reward_id	int	Primary Key	Unique identifier for each reward in the system
user_id	int	Foreign Key	Identifier for the user who earned the reward, referencing the user table

reward_points	int		Number of reward points associated with the reward
create_date	datetime		Date and time the reward was created

ix) Donation Table

Field Name	Data Type	Key	Description
donation_id	int	Primary Key	Unique identifier for each donation in the system
user_id	int	Foreign Key	Identifier for the user who made the donation, referencing the user table
charity_id	int	Foreign Key	Identifier for the charity organization, referencing the CharityOrganization table
tracking_id	int	Foreign Key	Identifier for the tracking information, referencing the Tracking table
status	varchar(10)		Current status of the donation, limited to 10 characters
reward_earned	int		Number of reward points earned for the donation
create_date	datetime		Date and time the donation was created

x) Charity Organization Table

Field Name	Data Type	Key	Description
charity_id	int	Primary Key	Unique identifier for each charity organization
address	varchar(255)		Address of the charity organization
name	varchar(70)		Name of the charity organization, limited to 70 characters

phone	varchar(20)		Phone number of the charity organization, limited to 20 characters
email	varchar(70)		Email address of the charity organization, limited to 70 characters
description	varchar(255)		Brief description of the charity organization, limited to 255 characters
longtitude	double precision		Geographic longitude of the charity organization
latitude	double precision		Geographic latitude of the charity organization

xi) Tracking Table

Field Name	Data Type	Key	Description
tracking_id	int	Primary Key	Unique identifier for each tracking record
current_location	varchar(255)		Current location of the tracked item
eta	varchar(10)		Estimated time of arrival, limited to 10 characters
status	varchar(10)		Current status of the tracking, limited to 10 characters

xii) Donation Item Table

Field Name	Data Type	Key	Description
item_id	int	Primary Key	Unique identifier for each donation item in the system
donation_id	int	Foreign Key	Identifier for the related donation, referencing the Donation table

item_category	varchar(20)		Category of the donation item, limited to 20 characters
age_group	varchar(20)		Age group for which the item is suitable, limited to 20 characters
quantity	int		Quantity of the donation item
condition	varchar(50)		Condition of the donation item, limited to 50 characters
additional_information	varchar(255)		Additional information about the donation item, limited to 255 characters

4.6 Wireframe Diagram

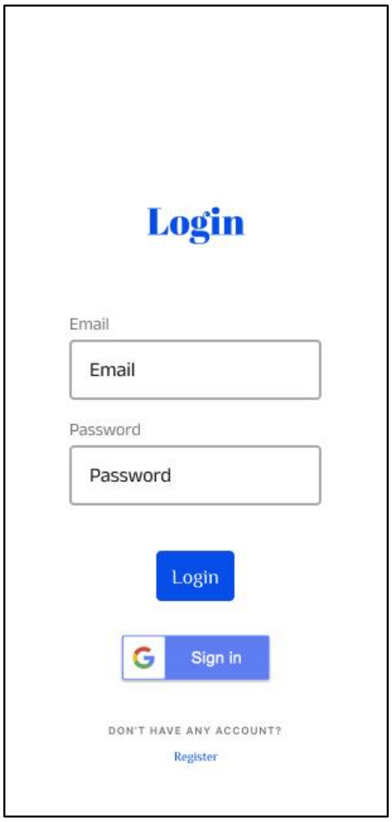


Figure 4.6a: Login Screen

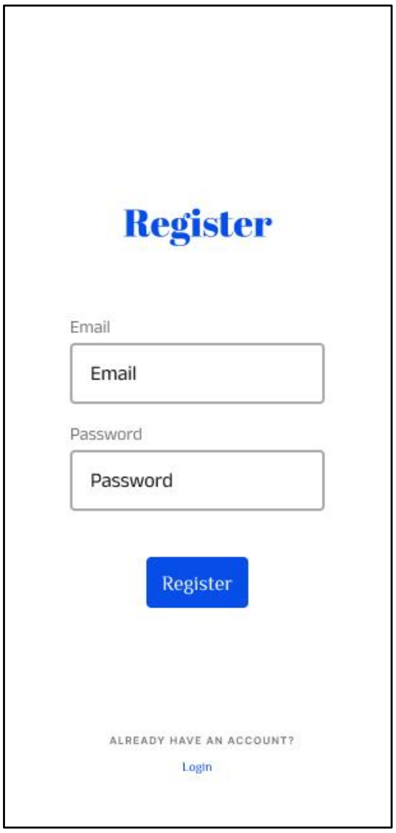


Figure 4.6b: Register Screen

The Login Screen (see Figure 4.6a) enables users to access the application by entering their registered email and password or through their Gmail account for a faster login experience. Meanwhile, the Register Screen (refer to Figure 4.6b) allows users to create a new account by providing their email address and selecting a password.

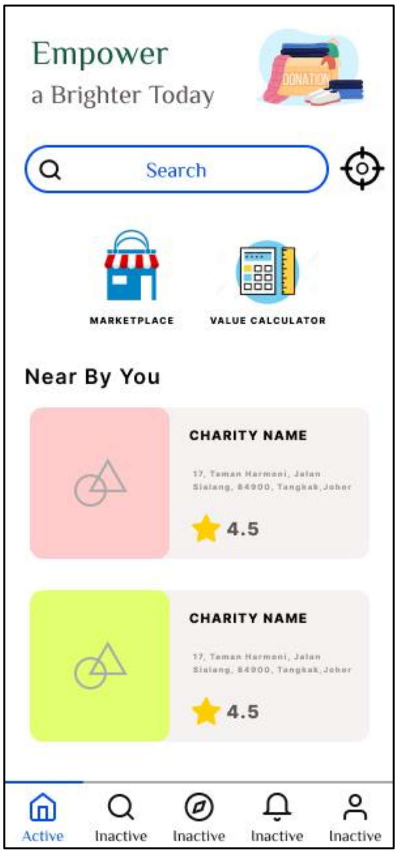


Figure 4.6c: Home Screen

Figure 4.6d: Charity Org's Screen

The Home Screen (see Figure 4.6c) primarily showcases a list of charity organizations located within a 10km radius of the user's area. It also features a search bar for users to look up specific charity names, and a current location icon to pinpoint the user's exact location.

The Charity Organization Screen (refer to Figure 4.6d) displays detailed information about a selected charity organization, including the organization's image, name, country's state, rating, description, and a map indicating its location. Additional details such as phone number, email, and address are also provided. A "Donate Now" button appears at the bottom of the screen, which, when clicked, directs users to the Donation Screen.

Figure 4.6e: Donation Screen

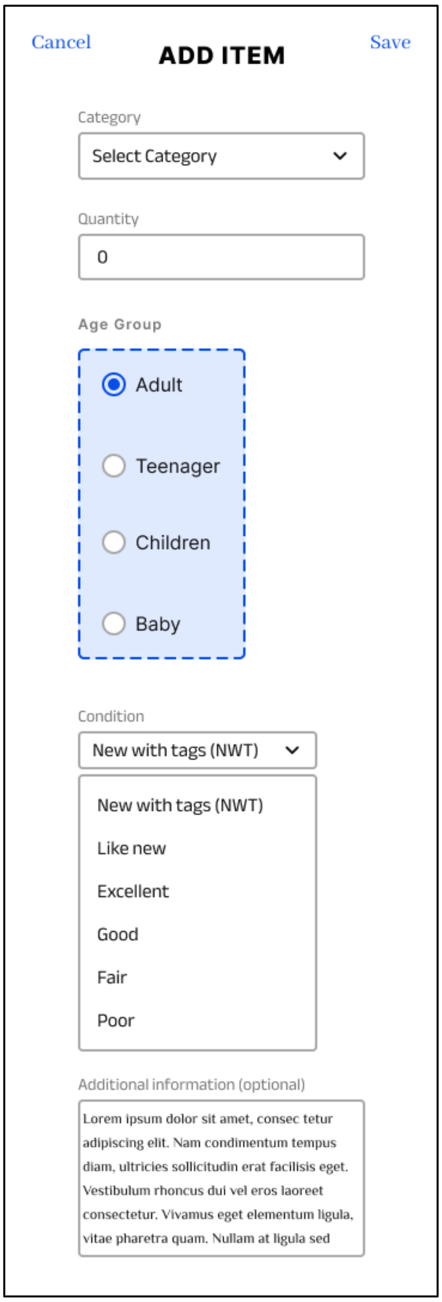


Figure 4.6f: Add Donation Item Screen

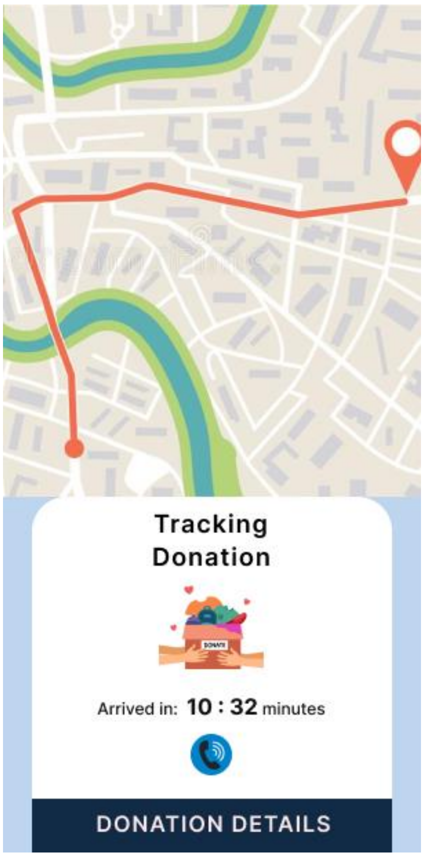


Figure 4.6g: Track Donation Screen

The Donation Screen (refer to Figure 4.6e) allows users to donate products to a specific charity organization. At the top, the charity organization's name is displayed, followed by a donor details section containing the current user's name, phone number, and address. Users can edit these details if necessary. The Donation Item(s) section displays a list of items the user has added for donation, and items can be added by clicking the "Add item" button, which directs users to the "Add Donation Item Screen." By clicking the "Donate" button, users are redirected to the "Track Donation Screen."

The Add Donation Item Screen (refer to Figure 4.6f) presents a form for users to enter details about a donation item. Users can specify the item category, quantity, age group, item condition, and any additional information (which is optional). After filling in the required information, users can click "Save" at the top of the screen, the details will appear in the Donation Item(s) section on the Donation Screen.

The Track Donation Screen (refer to Figure 4.6g) displays a map indicating the delivery driver's current location and the donor's location. The estimated time of arrival (ETA) is shown below the map, and a call button allows users to contact the driver directly. A Donation Details button at the bottom of the screen enables users to view donation details, including charity information, donor details, and a list of donated items.

Figure 4.6h: Marketplace Screen

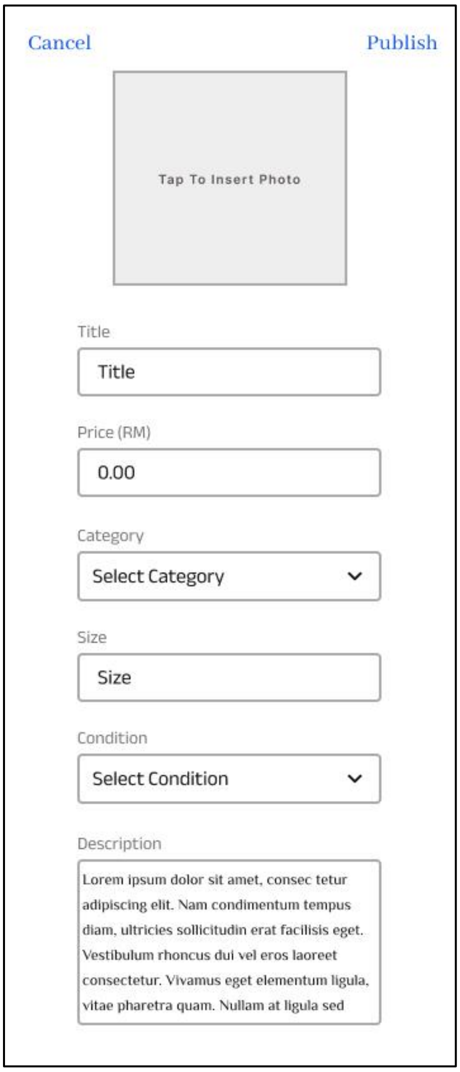


Figure 4.6i: Sell Product Form

The Marketplace Screen (refer to Figure 4.6h) showcases all available secondhand clothes for users to browse and purchase. A search bar is positioned at the top of the screen, with a button to the right that directs users to the Wishlist Screen. Below this, there is a filter and category dropdown list for users to refine their search, along with a "Sell" button that redirects users to the "Sell Product Form" screen. The center of the screen displays the list of products available for users to purchase.

The Sell Product Form (refer to Figure 4.6i) is a form for users to provide information about the secondhand clothes they wish to sell. The form includes an image view that allows users to upload a product image, as well as fields for the product title, price, category, size, product condition, and an optional description. Once users have entered all necessary details, they can click the "Publish" button located at the top right of the screen. The product will then be published and visible on the marketplace.

Figure 4.6j: Product's Details Screen

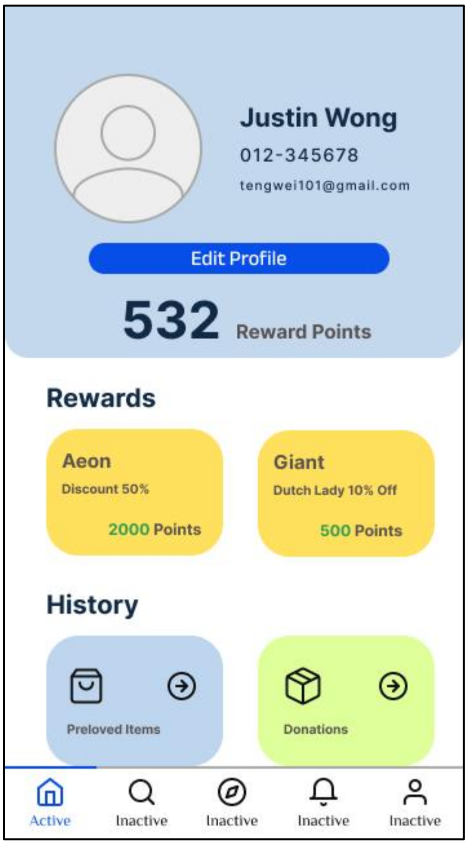


Figure 4.6k: User Profile Screen

The Product's Detail Screen (refer to Figure 4.6j) displays the product details when a user clicks on a product in the Marketplace Screen. The product image is at the top, with the product title below it and a favorite button to the right, allowing users to add the product to their wishlist. The description of the product follows, with the price displayed on the right-hand side below it. Additional details, such as category, size, color, and condition, are shown in the Item Details Section. The Positive Impact label indicates the benefits of purchasing secondhand clothes. The bottom of the screen displays the seller information section, which includes the seller's name, phone number, and state. A button on the right-hand side allows users to contact the seller directly via WhatsApp.

The User Profile Screen (refer to Figure 4.6k) presents user information within the application. The top section shows user details such as avatar, name, phone number, and email. An edit profile button is available for users to update their information. Below this is the total number of reward points earned from donations. The Reward section displays various rewards like discount vouchers and required points for users to claim using their reward points. The History section, located beneath the Reward section, consists of the Preloved Items history and Donation history. The Preloved Items history shows items the user has sold in the marketplace, and users can edit or delete products they are selling in this section. The Donation history displays the donation records made by the user, along with the reward points earned for each donation.

CHAPTER 5 System Implementation

5.1 Hardware Setup

To test the system from charity organization perspective and normal user perspective, using two Android emulators is essential for comprehensive testing. Running two Android emulators simultaneously can be resource-intensive, especially if the emulated devices are high-end with a lot of RAM and screen resolution. Here are the minimum recommended hardware requirements for developer to run two Android emulators smoothly:

1. Processor (CPU):

- A modern quad-core processor (like Intel i5 or higher, or AMD equivalent).
- Support for virtualization technology (Intel VT-x or AMD-V). This can significantly accelerate the emulator. Make sure it's enabled in your BIOS/UEFI settings.

2. Memory (RAM):

- 8GB of RAM is the absolute minimum, but 16GB is recommended. The exact requirement depends on the configurations of the emulators. For instance, if you're emulating devices with 2GB of RAM each, you'd need at least 4GB just for the emulators, not counting the RAM required for the OS, Android Studio, and other applications.

3. Graphics:

- A dedicated GPU is preferable but not absolutely necessary. Emulators can benefit from GPU acceleration. Modern integrated GPUs like Intel's Iris graphics can also handle emulator requirements reasonably well.
- Ensure you have the latest graphics drivers installed.

4. Storage:

- Solid State Drive (SSD) is highly recommended over Hard Disk Drive (HDD). SSDs can greatly improve emulator boot times and app installation speeds.

- Ensure you have ample free space, at least 50GB or more. The Android Emulator can use a lot of disk space, and this doesn't include space requirements for Android Studio, the Android SDK, and other necessary tools.

5. Operating System:

- Windows: Windows 8.1 or Windows 10 (64-bit) with the latest updates and service packs.
- macOS: macOS 10.14 (Mojave) or newer.
- Linux: Any modern Linux distribution with GNOME or KDE desktop environments.

5.2 Software Setup

Before starting to develop the proposed system, there are three software needed to be installed and downloaded in developer's laptop:

1. Android Studio IDE 2020 Version

   Android Studio is the official Integrated Development Environment (IDE) for Android application development, which is built on JetBrains' IntelliJ IDEA software. It provides various tools and features to help developers create, test, and debug Android applications.

   Configuration steps:

   a. Download the Android Studio 2020 installer from this link (https://redirector.gvt1.com/edgedl/android/studio/install/2020.3.1.26/android-studio-2020.3.1.26-windows.exe).

   b. Run the installer and follow the on-screen instructions to install Android Studio on your computer.

   c. Launch Android Studio and follow the setup wizard to install the required SDK packages and set up a development environment.

   d. Once the setup is complete, you can start creating, testing, and debugging Android applications using the IDE.

2. Android Emulator (For testing in different devices)

   The Android Emulator is a tool that allows developers to test their Android applications on different devices and configurations without the need for physical devices. It is an integral part of the Android Studio development environment.

   Configuration steps:

   a. Open Android Studio and navigate to the "Tools" menu, then select "AVD Manager" (Android Virtual Device Manager).

   b. Click on "Create Virtual Device" and choose a device from the list of available device profiles.

   c. Select a system image for the emulator.

      Release Name: Q

      API Level: 29

      ABI: x86

      Target: Android 10.0 (Google Play)

   d. Configure any additional hardware or software options as needed, then click "Finish" to create the virtual device.

   e. Once the virtual device is created, you can run and test your Android applications on the emulator directly from Android Studio.

3. Git for Windows (Gitbash)

   Git for Windows is a software package that provides a Git command-line environment for Windows users. Gitbash is a command-line shell included in the Git for Windows package, which allows developers to execute Git commands on Windows OS easily.

   Configuration steps:

   a. Download the Git for Windows installer from the official website (https://gitforwindows.org/).

   b. Run the installer and follow the on-screen instructions to install Git for Windows and Gitbash on your computer. During the installation process, you can configure various settings like line endings, terminal emulator, and more, based on your preferences.

c. After the installation is complete, you can launch Gitbash from the Start menu or by right-clicking on a folder and selecting "Git Bash Here."

d. Configure your Git identity (name and email) by running the following commands in the Gitbash terminal:

git config --global user.name "Your Name"

git config --global user.email "youremail@example.com"

e. You can now use Gitbash to manage your repositories, clone, commit, push, and perform other Git-related tasks in your development workflow.

5.3 Setting and Configuration

5.3.1 Copy the project files to new project folder using Git clone

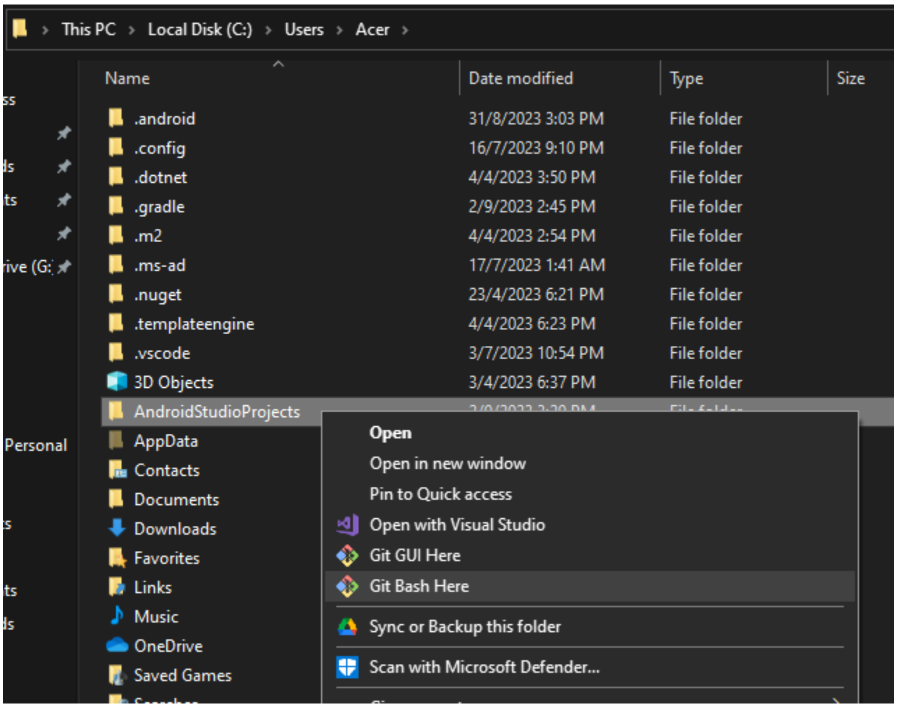


Figure 5.3.1a: Go to AndroidStudioProjects Folder and Select "Git Bash Here"

Open the 'AndroidStudioProjects' folder on computer, and right-click within the folder to open the context menu. From the menu, select the 'Git Bash Here' option to launch the Git Bash terminal in that directory.

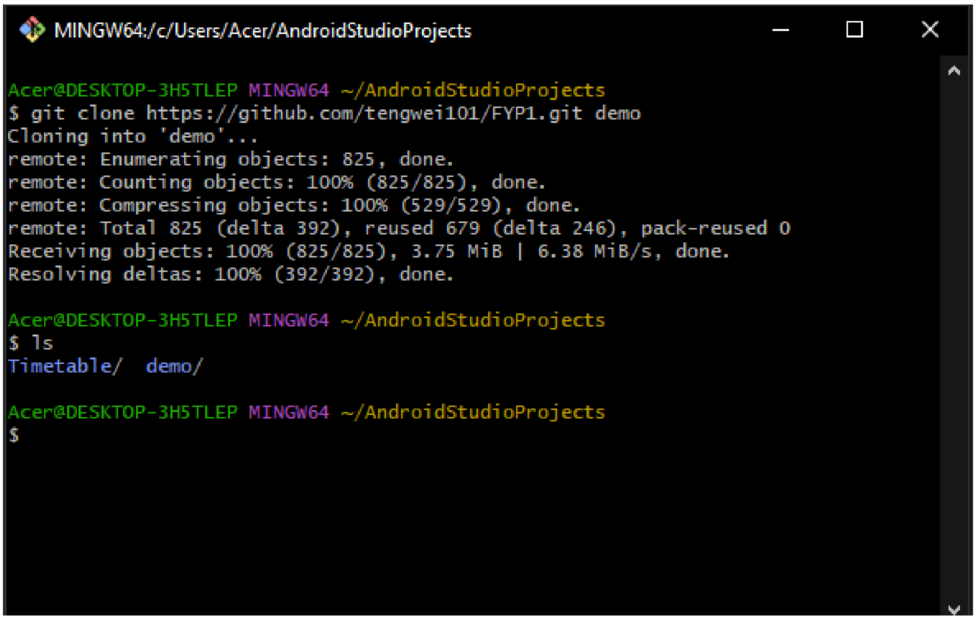
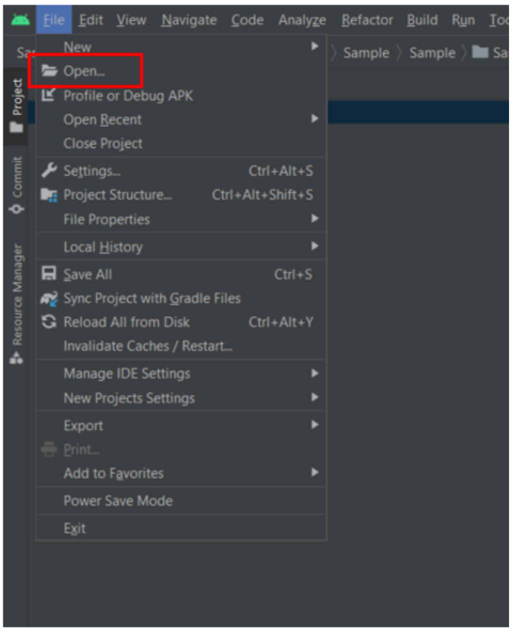


Figure 5.3.1b: Enter Git Clone command

Figure 5.3.1b depicts the process of cloning a repository using Git Bash. Once Git Bash is opened within the desired directory (as mentioned in Figure 5.3.1a), input the command "git clone https://github.com/tengwei101/FYP1.git YourNewProjectName". This command fetches the content of the specified GitHub repository and saves it under a new directory named 'YourNewProjectName'. To verify the cloning process was successful and the project exists in the current directory, developer can use the ls command.



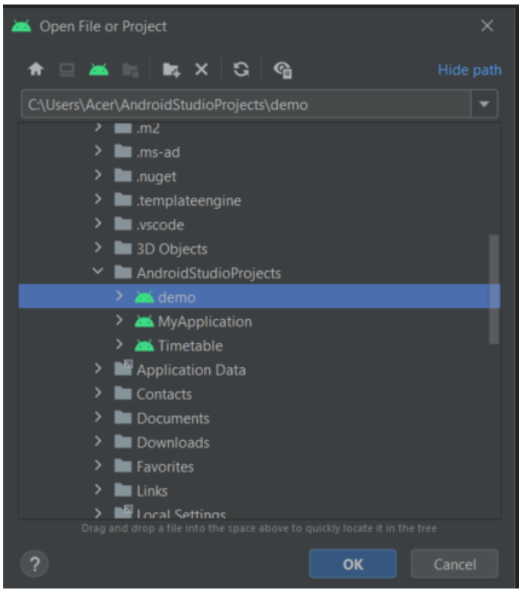


Figure 5.3.1c: Open Project

Figure 5.3.1d: Select Project to open

After cloning the project, launch Android Studio. On its welcome screen, developer will find an option labeled 'Open an Existing Android Studio Project'. Click on this option to proceed. Upon clicking 'Open an Existing Android Studio Project', a file explorer window (see Figure 5.3.1d) will appear. Navigate to the 'AndroidStudioProjects' directory where he/she cloned the repository. Inside this directory, he/she should see the 'YourNewProjectName' folder, which is the project he/she just cloned. Select this folder and then click the 'OK' or 'Open' button. Android Studio will now load the project and sync it with Gradle, making it ready for development and testing.

5.3.2 Connect Project to Firebase

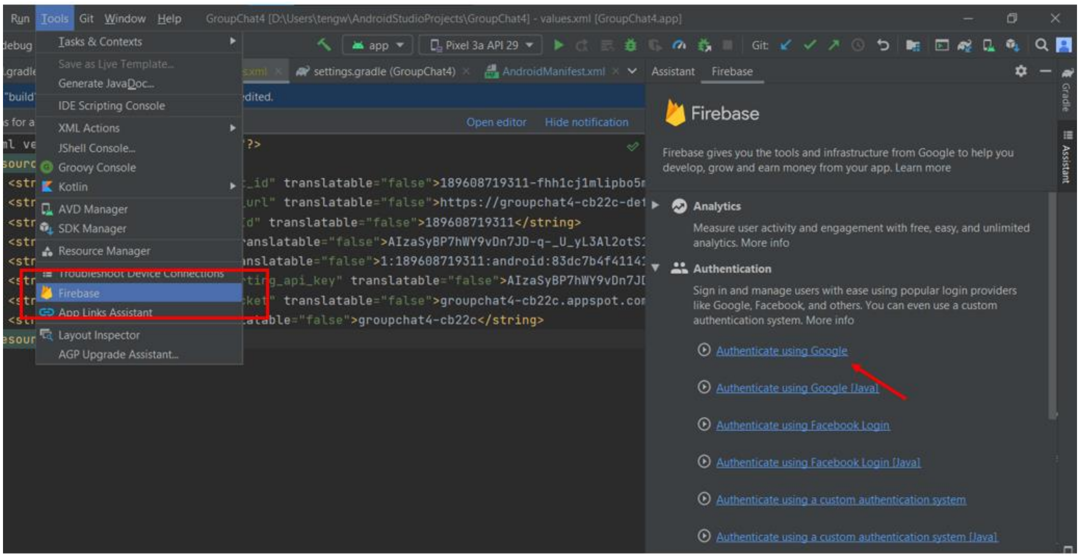


Figure 5.3.2a: Open Firebase Tools

In Android Studio, to access Firebase Tools, navigate to the top menu bar and click on the “Tools” option. From the dropdown menu that appears, select “Firebase”. This action will open the Firebase Assistant pane on the right side of the Android Studio interface. Within this pane, locate and click on the 'authentication' section to reveal its options. Now, select 'Authenticate with Google' to connect Firebase to the app.

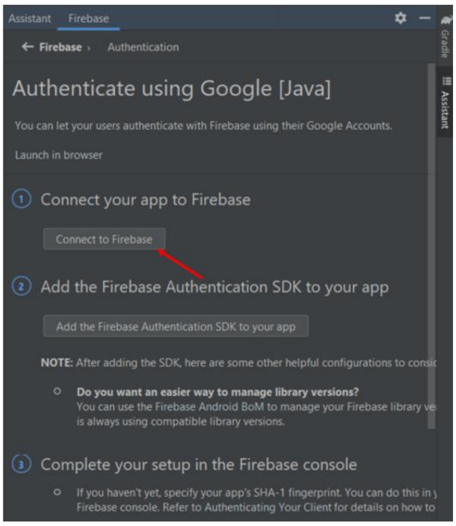


Figure 5.3.2b: Connect to Firebase

In the 'Authenticate using Google' tutorial window that appears within Android Studio, the first step is to establish a connection between the Android application and Firebase. To do this, look for the 'Connect to Firebase' button prominently displayed in the tutorial pane. Click on this button to initiate the connection process, which will then link the current Android project to a Firebase project, enabling seamless integration of Firebase services into the app.

Figure 5.3.2c: Error When Connecting to Firebase

When attempting to connect the Android application to Firebase, developer might encounter an error message, as depicted in Figure 5.3.2c. The error states: 'Could not parse the Android Application Module's Gradle config. Resolve gradle build issues and/or resync.' This error indicates an issue with the project's Gradle configuration, preventing a successful connection to Firebase.

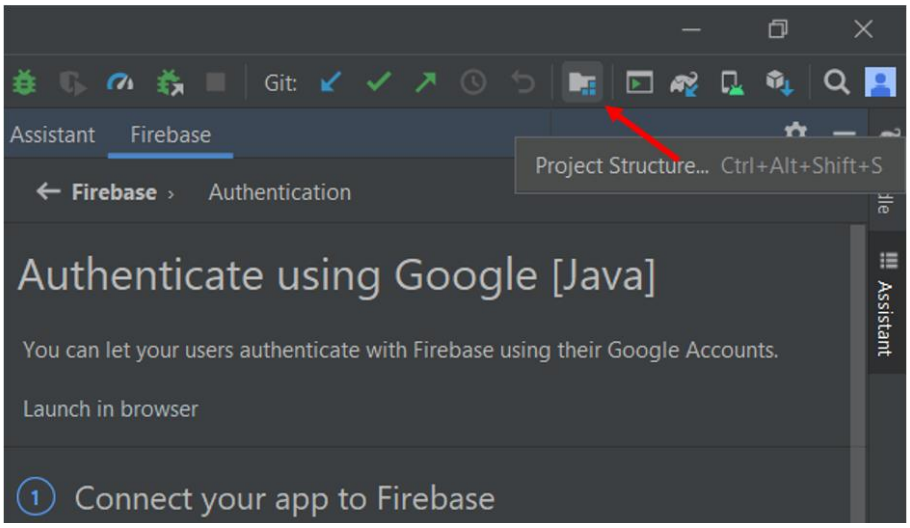


Figure 5.3.2d: Go to Project Structure

To address the aforementioned error, he/she will need to examine the project's structure and configurations. In Android Studio, developer can do this by navigating to the 'Project Structure', as shown in Figure 5.3.2d. Here, developer can review and adjust the project's dependencies and configurations, ensuring they align correctly for Firebase integration.

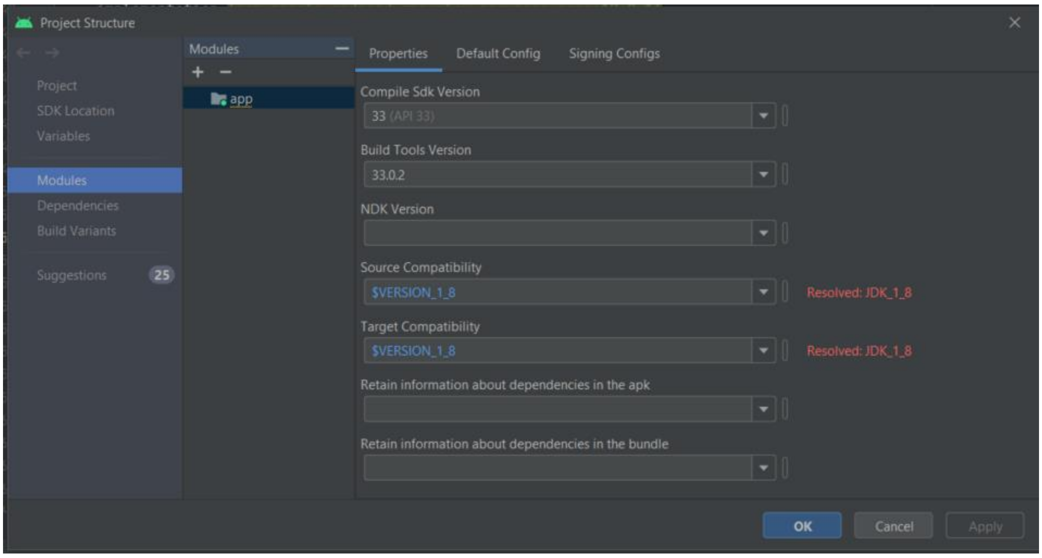


Figure 5.3.2e: Configure Modules Version

In the Project Structure dialog, navigate to the left sidebar and select 'Modules'. Under 'Modules', developer will see various configuration options. Click on 'Properties' within this section. This will present them with settings related to the Android SDK and other build tools. In the 'Properties' pane, find the 'Compile Sdk Version' dropdown. From the available options, select '33 (API 33)'. Next, locate the 'Build Tools Version' dropdown and choose '33.0.2'. After adjusting these settings to the specified versions, ensure to click the 'OK' button to save these changes. This will help rectify the error encountered during the Firebase connection by ensuring their project's configurations align with Firebase's requirements.

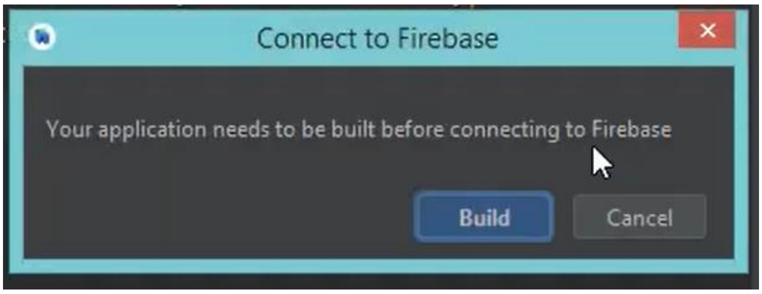


Figure 5.3.2f: Build Application before Connect to Firebase

In Figure 5.3.2f, developer might encounter a warning message stating, 'Your application needs to be built before connecting to Firebase'. This warning means that Android Studio requires a successful build of their current project to ensure there are no compilation issues or other build-related errors before it can connect to Firebase. Building the application beforehand ensures that the project's structure and configurations are correct and up-to-date, providing a stable foundation for integrating Firebase services.

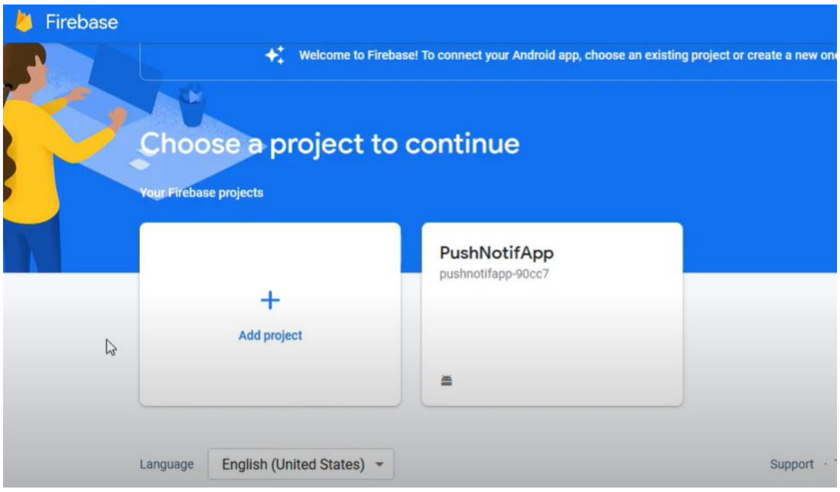


Figure 5.3.2g: Create new project in Firebase

In Figure 5.3.2g, once a developer resolves prior issues and attempts to reconnect to Firebase from Android Studio, a web browser will automatically launch. This is the Firebase Console's interface, prompting developers to create a new Firebase project. Here, developers can name their new project, configure settings, and link it directly to the Android app in development. This seamless integration facilitates the immediate use of Firebase services within the Android Studio environment once the project is set up.

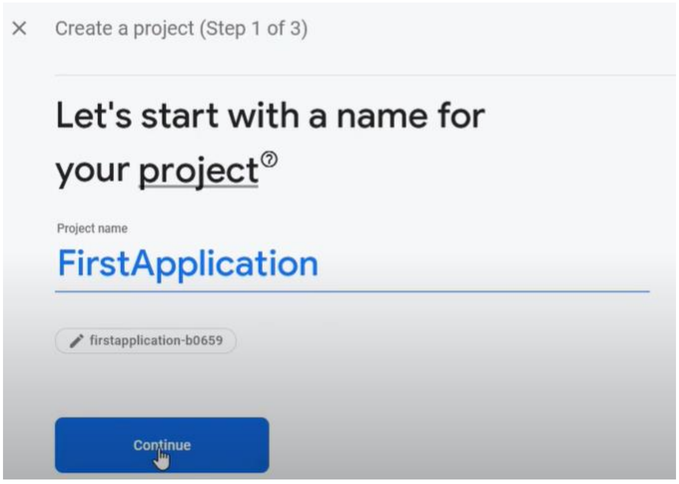


Figure 5.3.2h: Name the project

In Figure 5.3.2h, within the Firebase Console's interface, there's a field or section dedicated to naming the new Firebase project. Here, developers can provide a descriptive and unique name for their project, allowing for easier identification and management, especially if they manage multiple Firebase projects. Typically, this name aligns with the application's name or its primary function to ensure clarity.

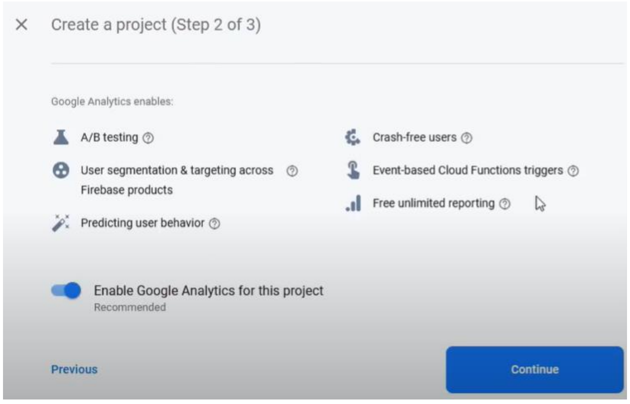


Figure 5.3.2i: Enable Google Analytics

Moving on to Figure 5.3.2i, after naming the project, the Firebase Console may prompt developers with the option to enable Google Analytics for the project. Google Analytics integration provides insightful data and analytics related to app usage, user behaviors, and more. By toggling or selecting the relevant option, developers can activate Google Analytics, thereby getting a comprehensive view of their app's performance and user engagement

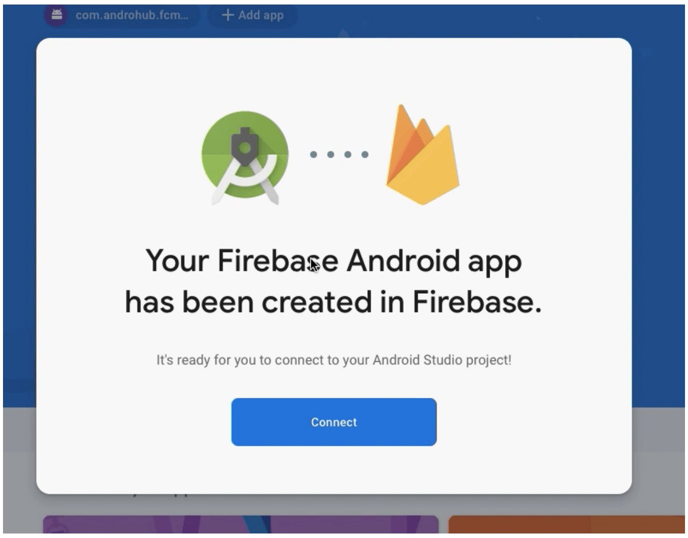


Figure 5.3.2j: Click Connect

In Figure 5.3.2j, after the successful creation of a Firebase project and its association with the Android app, a confirmation dialog appears within the Firebase Console. This dialog states, 'Your Firebase Android app has been created in Firebase.' At the bottom or within this dialog, there's a button labeled 'Connect'. Developers should click on this 'Connect' button to finalize the linking process between the Android Studio project and the newly created Firebase project. By doing so, they ensure that the app is ready to integrate and utilize various Firebase services.

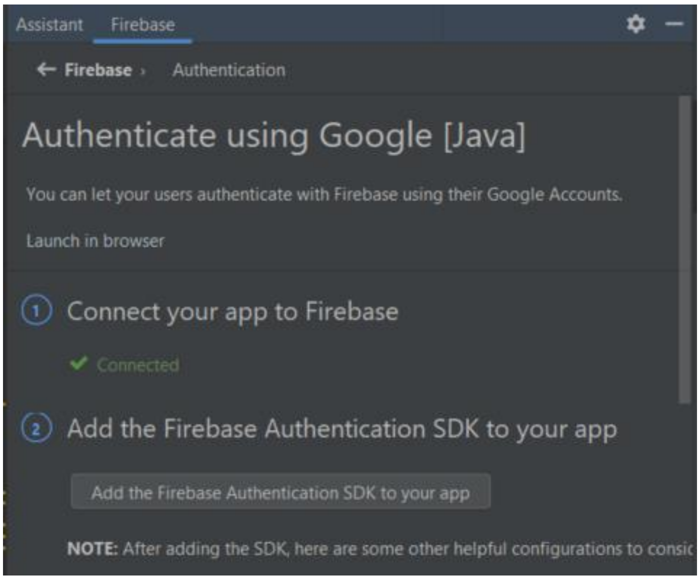


Figure 5.3.2k: Connect to Firebase Successfully

In Figure 5.3.2k, back in the Android Studio environment, beneath the 'Connect your app to Firebase' section, developers will notice a status update labeled 'Connected'. This confirmation signifies that the linking process was successful and the Android Studio project is now seamlessly integrated with the Firebase project. As such, developers can now confidently leverage Firebase's suite of tools and services within their Android application.

5.3.3 Run the system

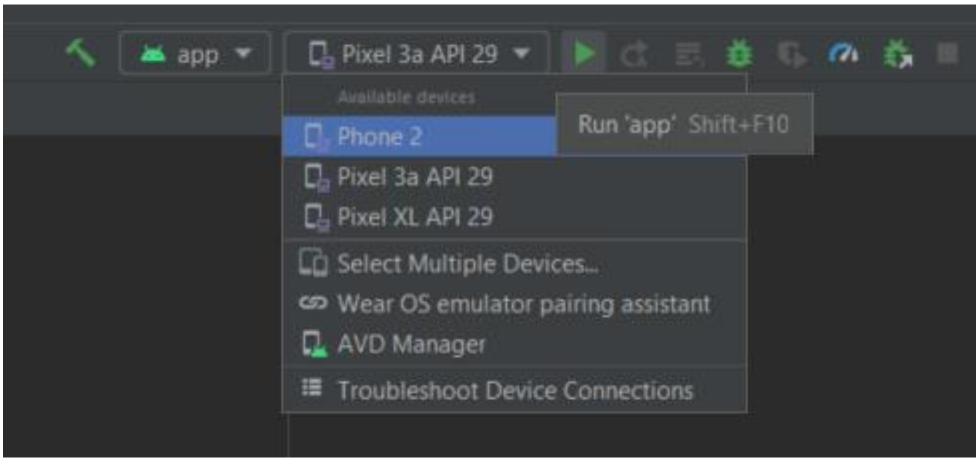


Figure 5.3.3a: Select an Android Emulator to Run the App

In Figure 5.3.3a, within the Android Studio interface, developers are presented with an option to choose an Android Emulator for testing and running their application. Typically, this can be found near the top of the IDE, next to the 'Run' button. A dropdown menu provides a list of available emulators, configured with different device profiles, Android versions, and screen resolutions. By selecting a desired emulator from this list, developers can simulate how their app behaves and appears on that specific device configuration. Once an emulator is selected, pressing the 'Run' button will launch the app on that emulator, allowing for real-time testing and debugging.

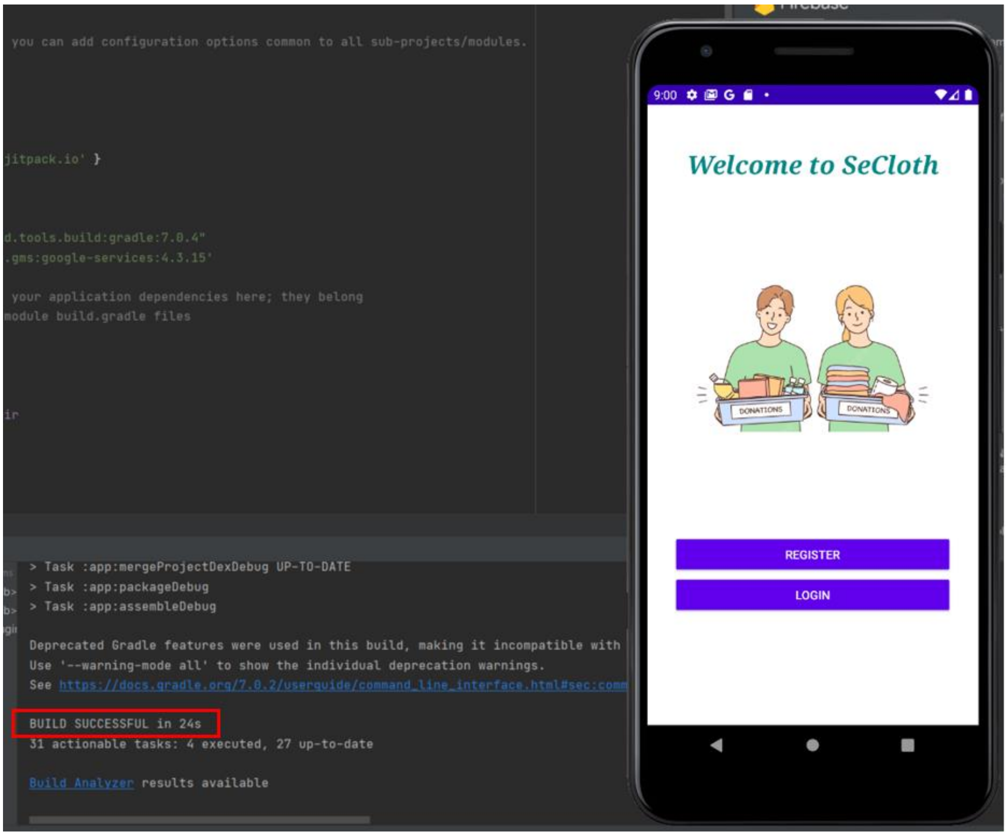


Figure 5.3.3b: App has been built successfully

In Figure 5.3.3b, we see a clear indicator of a successful build process within the Android Studio environment. The message "BUILD SUCCESSFUL" is prominently displayed, often in the bottom console or the 'Build' output window, signifying that the application was compiled without any errors. The appended 'in 24s' denotes the duration it took for the build process to complete, which in this case is 24 seconds.

Simultaneously, on the right side of the Android Studio interface, the emulator window is active, showing the Android device simulation. If the app's user interface or startup screen is visible on this emulator, it means the app was successfully deployed and is currently running on the emulator. This gives developers a firsthand look at how their application performs and appears on the chosen simulated device.

5.4 System Operation (with Screenshot)

5.4.1 Register and Login Screen

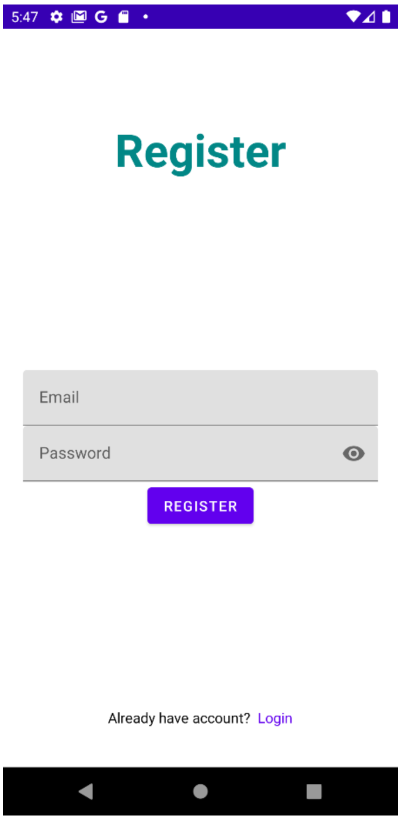


Figure 5.4.1a: Register Screen

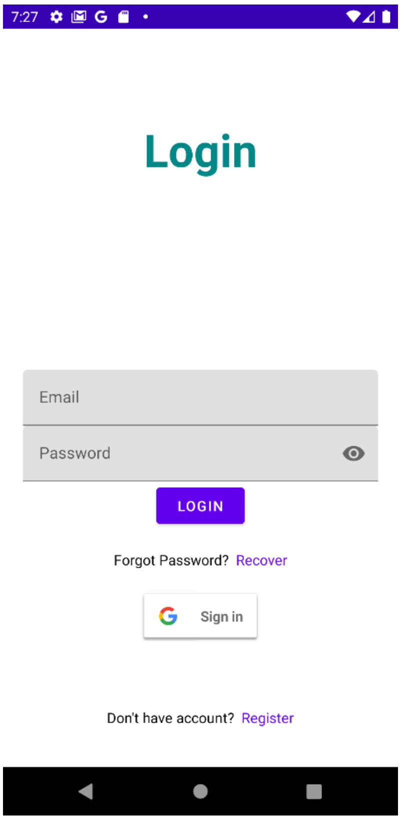


Figure 5.4.1b: Login Screen

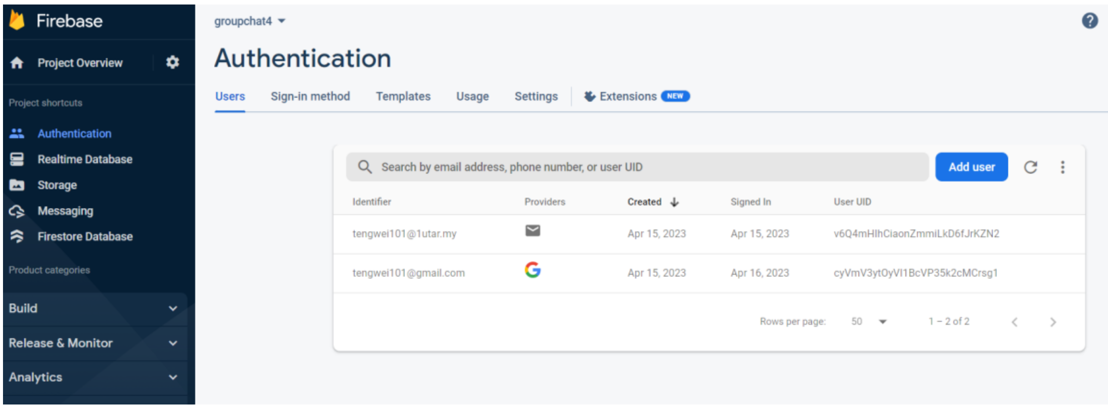


Figure 5.4.1c: Firebase Authentication Users

In the figure above (see Figure 5.4.1a), the registration screen allows users to create an account. Users input their email and password, then click the "Register" button to establish a new account using the FirebaseAuth API. The createUserWithEmailAndPassword() method, provided by the API, streamlines the registration process by taking the email and password as parameters. Once an account is created, user information, including email and password, is stored in Firebase Authentication Users, and a unique UID is automatically assigned to each user. Users can then proceed to the Login Screen (refer to Figure 5.4.1b) and sign in using their registered email and password.

In addition, FirebaseAuth offers an alternative login method through Gmail, allowing users a faster way to access the system. By simply clicking the Google Login button, users can sign in without having to manually input their email and password.

5.4.2 Marketplace Screen

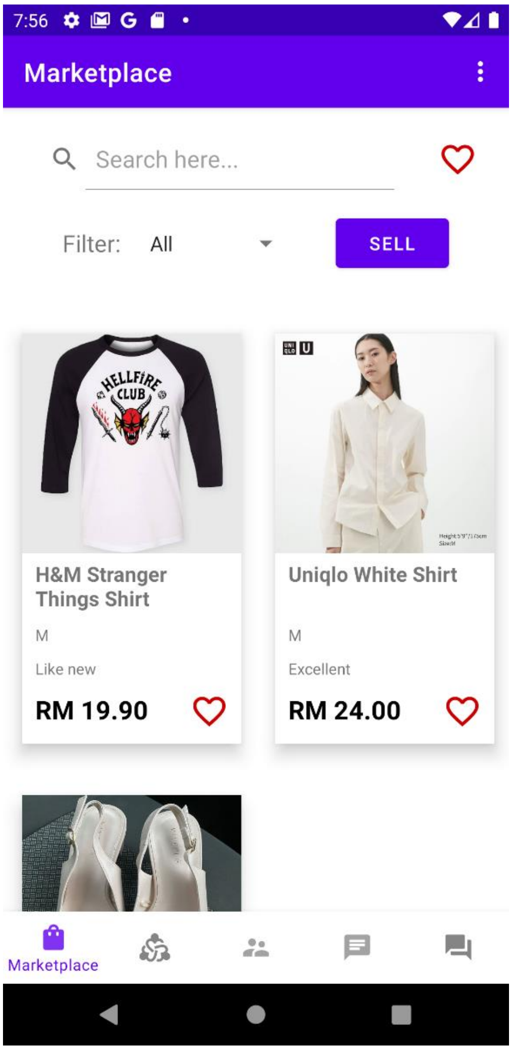


Figure 5.4.2a: Marketplace Screen

In the figure above (see Figure 5.4.2a), the marketplace screen presents a range of available products for sale. At the top of the screen, a search bar allows users to look for specific products by name. Adjacent to the search bar, on the right-hand side, is the Wishlist button. Below the search bar, a filter drop-down menu offers the option to sort products by category, enabling users to narrow down their search. If a user is interested in selling secondhand clothes, they can click the "Sell" button, which then prompts an "Sell Product" form. Users can input the necessary details about the product they want to sell. Lastly, the central portion of the screen displays the list of products, all of which are fetched from Firebase.

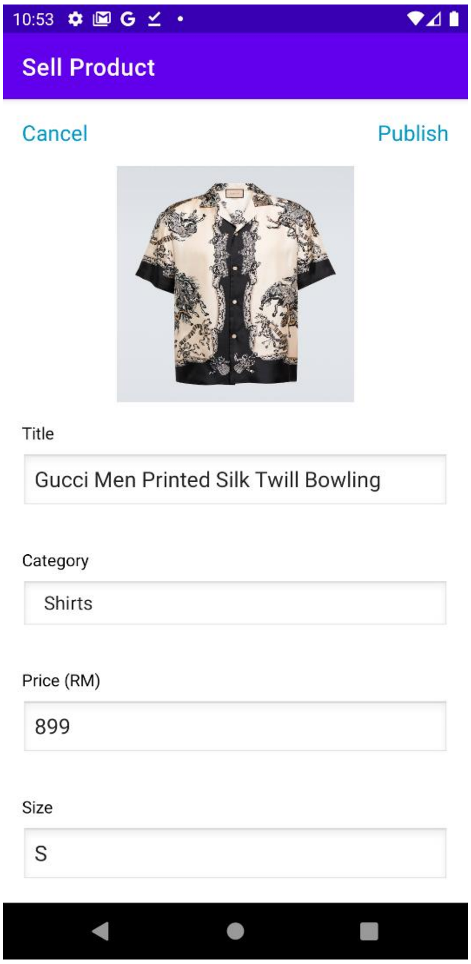


Figure 5.4.2b: Sell Product Form

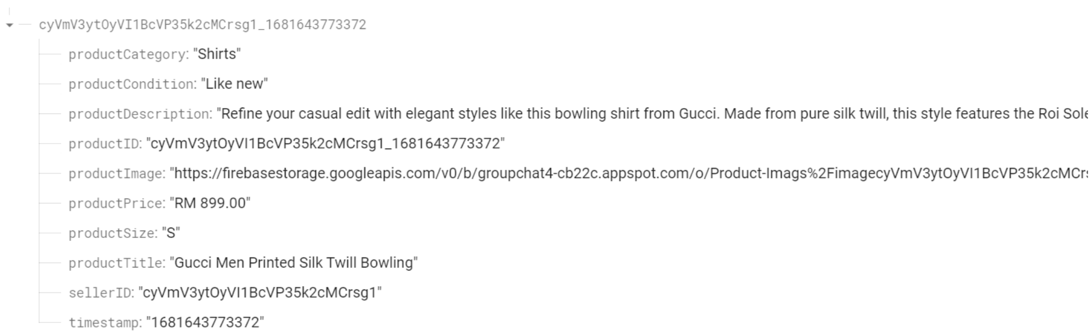


Figure 5.4.2c: Product Record in Firebase

The figure above (Figure 5.4.2b) is the Sell Product form, which enables users to add and publish their products to the marketplace. Users can provide details such as product image, title, category, price, size, condition, and description. After completing the required fields, users can publish their product by clicking on the "Publish" text. Upon submission, the system stores the product information with the sellerID in Firebase and updates the product list displayed in the marketplace accordingly, ensuring that the most current offerings are shown.

5.4.3 Product Details Screen

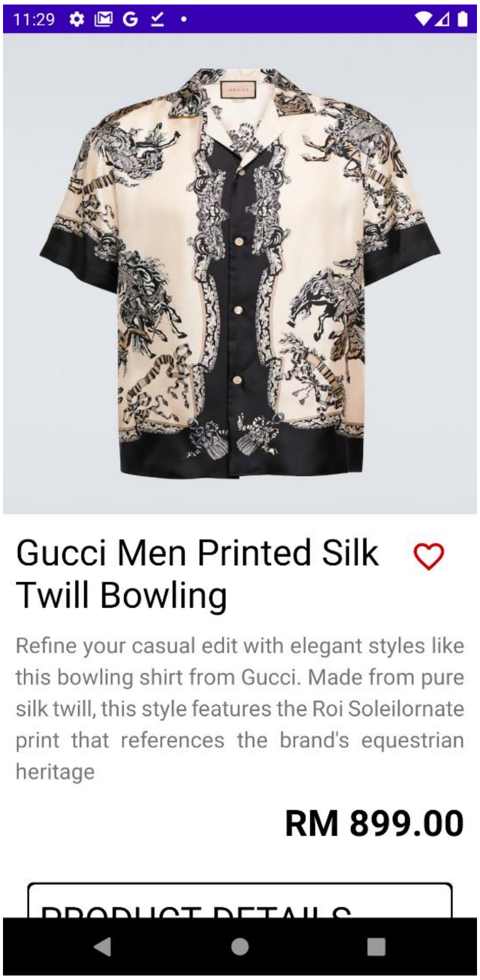


Figure 5.4.3a: Product Details

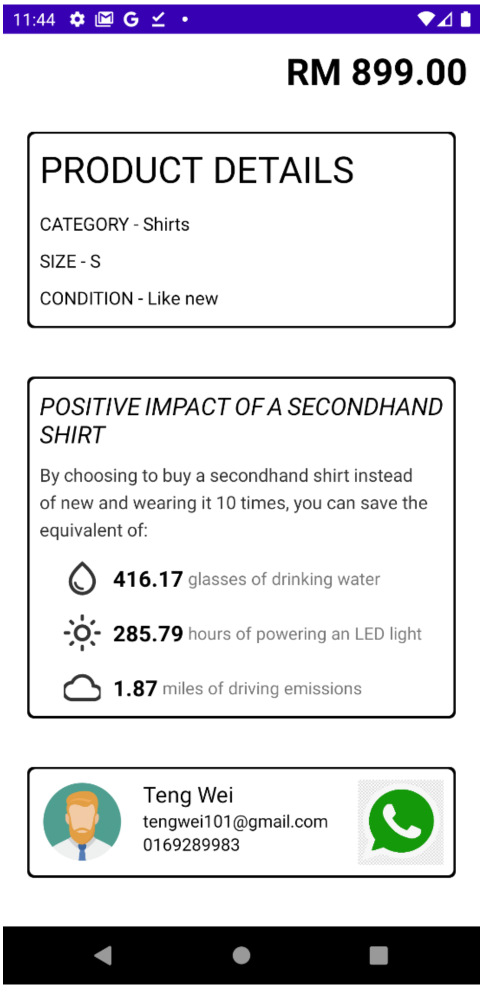


Figure 5.4.3b: Other Product Details

The figure above (see Figure 5.4.3a) presents the product details displayed after a user selects a product from the product list. The product image appears at the top of the screen, followed by the product title and an "Add to Wishlist" button. The product description is located below the title, with the price shown underneath.

Figure 5.4.3b showcases three sections: Product Details, Positive Impact, and Seller Information. The Product Details section highlights the product's category, size, and condition. The Positive Impact section emphasizes the environmental benefits of purchasing secondhand clothes, promoting the idea of reducing waste by opting for pre-owned products. Lastly, the Seller Information section provides the seller's avatar, name, email, and phone number. A WhatsApp icon on the right side of this information act as a button that allows users to send a WhatsApp message directly to the seller's phone number.

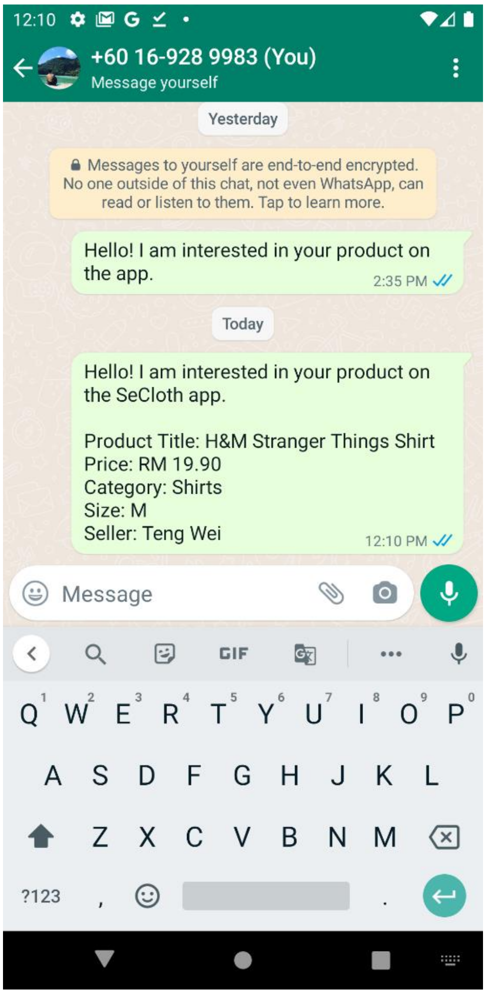


Figure 5.4.3c: Send WhatsApp Message

Upon clicking the WhatsApp icon, the system utilizes the WhatsApp API to seamlessly redirect users to the WhatsApp application. The API call includes the seller's phone number and an encoded message, which is formatted correctly using URLEncoder. Integrating the WhatsApp API in this manner provides a convenient and user-friendly way for potential buyers to communicate directly with sellers. This feature streamlines the process of inquiring about products and discussing any concerns or negotiations, ultimately enhancing the overall user experience within the platform.

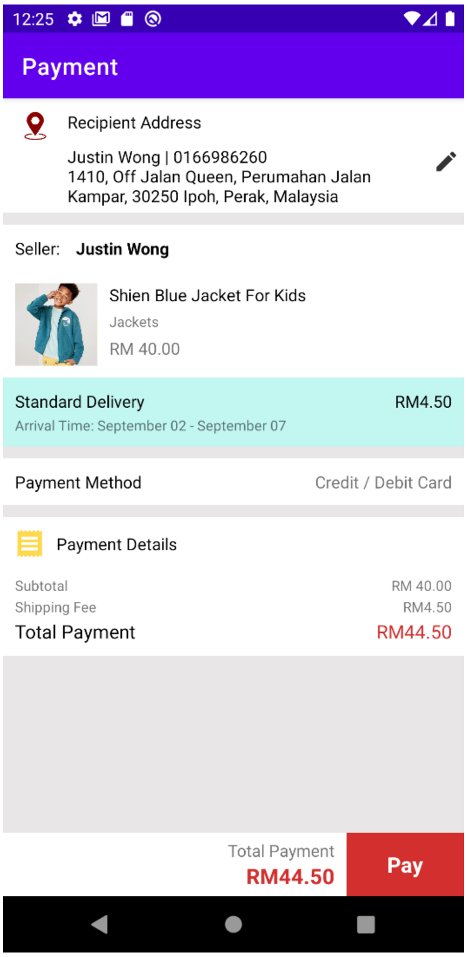


Figure 5.4.3d: Payment Screen

In the "Payment Screen" depicted in Figure 5.4.3d, users are transitioned here post selecting the "Purchase" option. Initially, they are presented with the recipient address, ensuring their order reaches the correct location. This section encapsulates details such as the user's name, phone number, and comprehensive address.

For clarity and a final check, the screen also displays some of the product's particulars. This includes a visual cue through the product image, reinforcing the user's purchase decision and guaranteeing they've selected the desired product.

Moving down, users are informed about the delivery method, equipped with information regarding the estimated time of arrival and any associated shipping charges. This equips the user with a time frame for the delivery and any extra costs linked to it.

Navigating further, the platform provides a variety of payment methods, granting flexibility in how users wish to finalize their purchase. This ensures that they can choose a mode they're comfortable with.

To wrap up the transaction, the screen concludes with the payment details section. Here, a clear breakdown of the financials is provided. It displays the initial product cost (subtotal), any added shipping fees, and the comprehensive total amount to be paid. This transparent representation ensures that users are fully aware of the costs and can make an informed purchase.

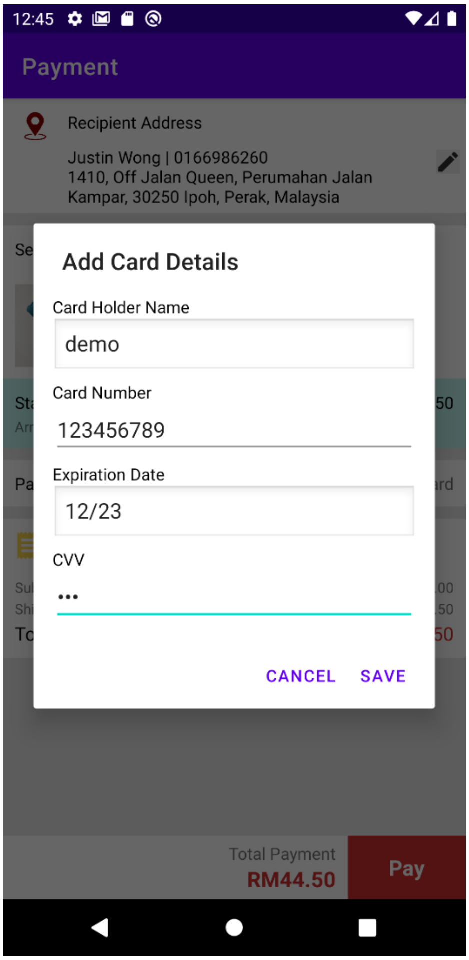


Figure 5.4.3e: Add Card Detail

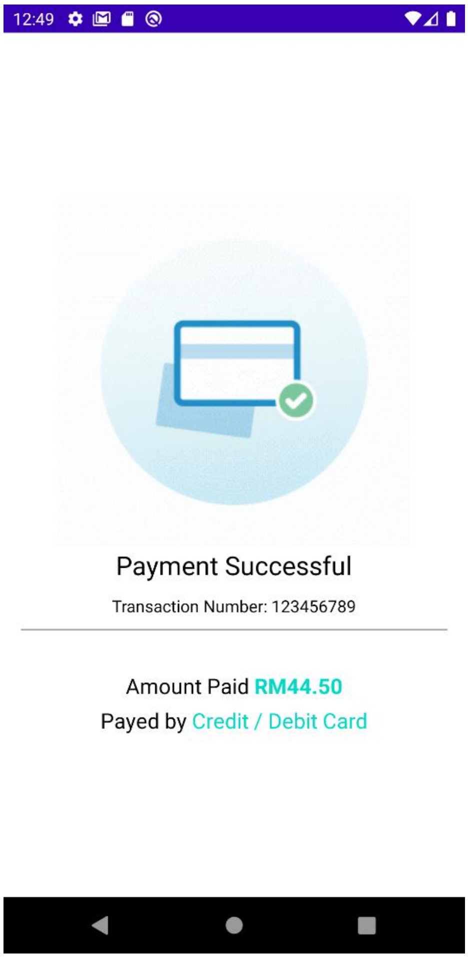


Figure 5.4.3f: Payment Success

In Figure 5.4.3e, titled "Add Card Detail," the system initiates the payment process by prompting users to input their card information. Upon clicking the "pay" button, a form appears, requesting essential card details. This form comprises fields for the cardholder's name, the card number, the card's expiration date, and its CVV security code. Such thoroughness ensures that the transaction is secure and valid.

Completing these fields is mandatory for the transaction. Once the user enters this information and selects "save," the system processes the payment.

Should the payment be successful, the user is seamlessly redirected to the "Payment Success" interface, as visualized in Figure 5.4.3f. This interface serves as a confirmation page, presenting users with critical transaction details. Specifically, it showcases the transaction number, which serves as a unique identifier for that specific purchase, the exact amount that was paid, and the method used for the payment. This design ensures that users have a record of their transaction and a sense of closure after completing their purchase.

5.4.4 Charities Screen

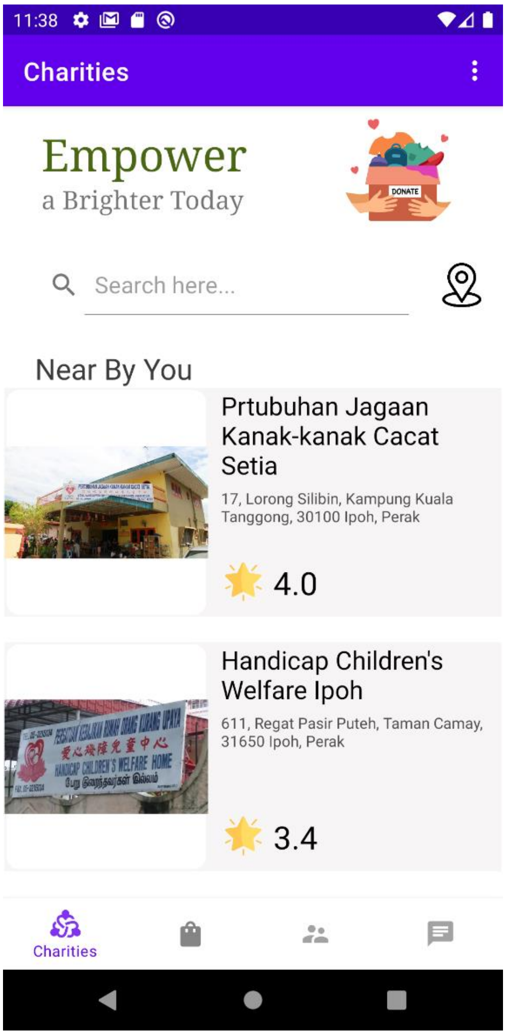


Figure 5.4.4a: Charity Organization List

The Charity Screen (see Figure 5.4.4a) of the application provides users with a comprehensive list of charity organizations. At the top of this screen, there’s a search bar allowing users to quickly locate a specific charity by name. Adjacent to the search bar is a location pinpoint icon. By tapping this, users can access and set their current location. Upon doing so, the application then filters and presents a list of charity organizations located within a 10km radius of the user's location. Each entry on the list showcases the charity organization's name, address, and a rating represented by stars (e.g., 4.0). Tapping on any organization provides users with a detailed view of that particular charity.

5.4.5 Charity Organization Detail Screen

Figure 5.4.5a: Charity Details 1

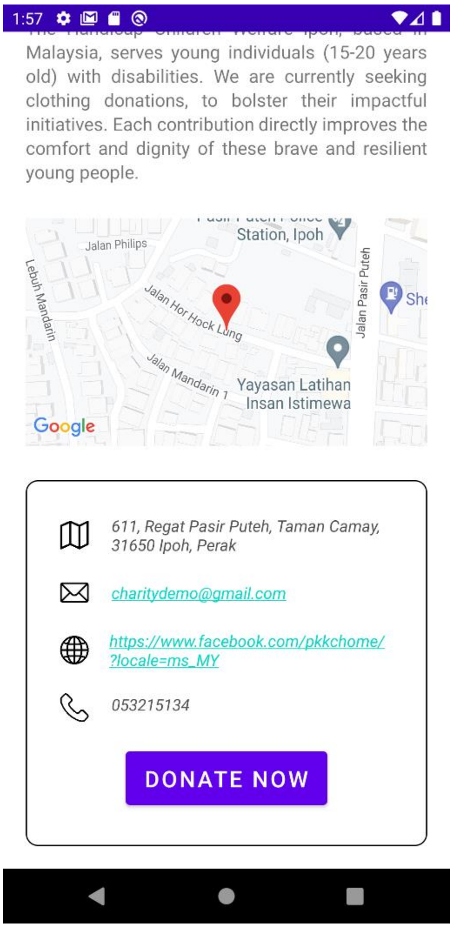


Figure 5.4.5b: Charity Details 2

In Figure 5.4.5a, the visual captures the primary details of a selected charity. This includes a prominent display of the charity's image, its name, the state within the country it operates in, the rating it has received, and a brief description providing an overview of the organization.

Figure 5.4.5b delves deeper into the logistical aspects of the charity. At the top, the charity's exact location is pinpointed on a Google Map, offering users a geographical context. Directly below the map, users can find the charity's comprehensive contact details, this encompasses its full address, email, official website link, and phone number. Concluding the page is a strategically placed 'Donate Now' button, prompting and facilitating users to support the charity directly through the application.

5.4.6 Donation Request Form Screen

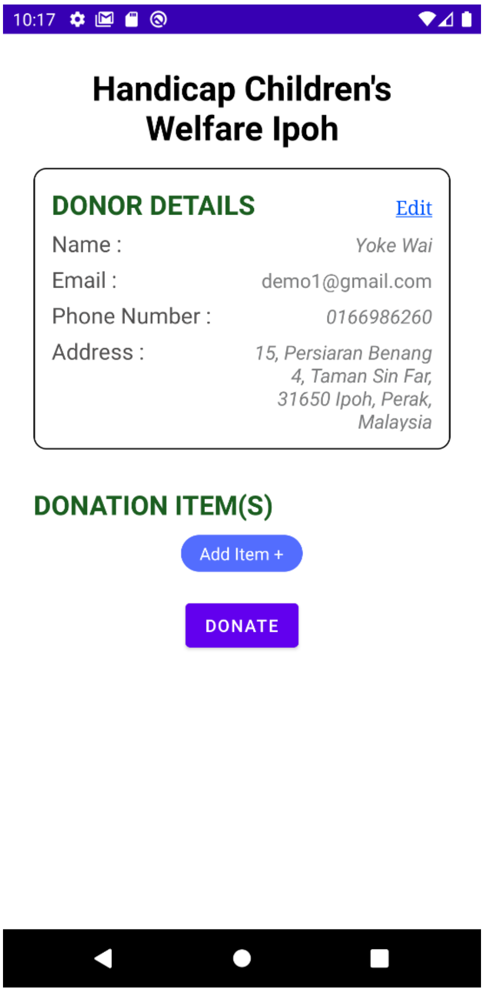


Figure 5.4.6a: Donation Request Form

In Figure 5.4.6a, titled 'Donation Request Form', the interface presented to users upon clicking the 'Donate Now' button is showcased. This form facilitates users in formally submitting a donation request to the selected charity. At the top, the charity's name is prominently displayed, ensuring users are aware of the donation's intended recipient. Directly below, the 'Donor Details' section automatically populates with the current user's information, including their name, email, phone number, and address. This ensures consistency and convenience, as users won't have to repeatedly input their personal details. The form concludes with a designated section for listing the donation item(s) they intend to give. This structured layout aims to simplify the donation process while gathering all requisite details.

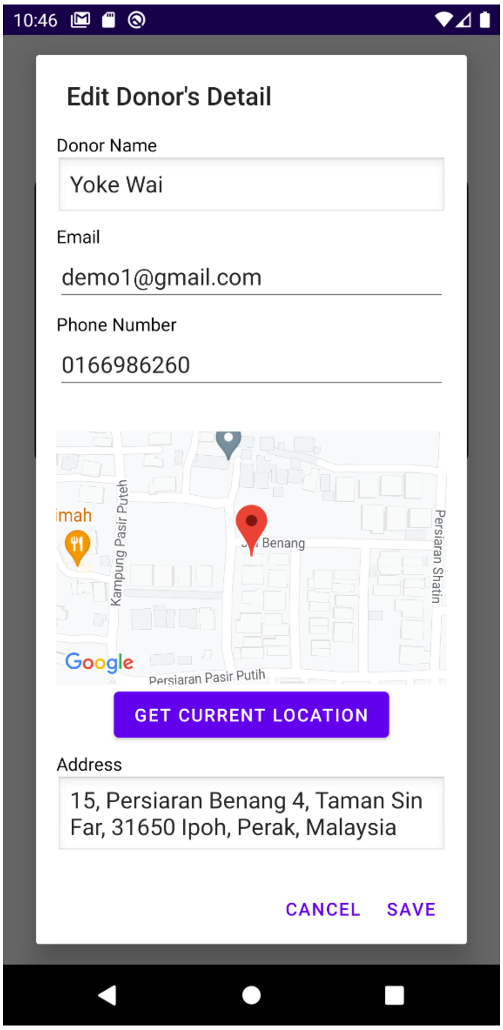


Figure 5.4.6b: Edit Donor's Detail Form

Figure 5.4.6b, titled 'Edit Donor's Detail Form', showcases a feature allowing users to modify their donor details. Within the donor detail section, an 'Edit' text button is visible. Clicking this button triggers the Edit Donor's Detail Form to appear, with fields pre-populated with the user's existing details for convenience. Notably, the form includes a 'Get Current Location' button. When pressed, the system automatically identifies and inserts the user's current location into the address field. Upon making any necessary modifications, users can confirm changes by clicking 'save'. The donor details on the donation request form, as illustrated in Figure 5.4.6a, will then be updated to reflect these changes.

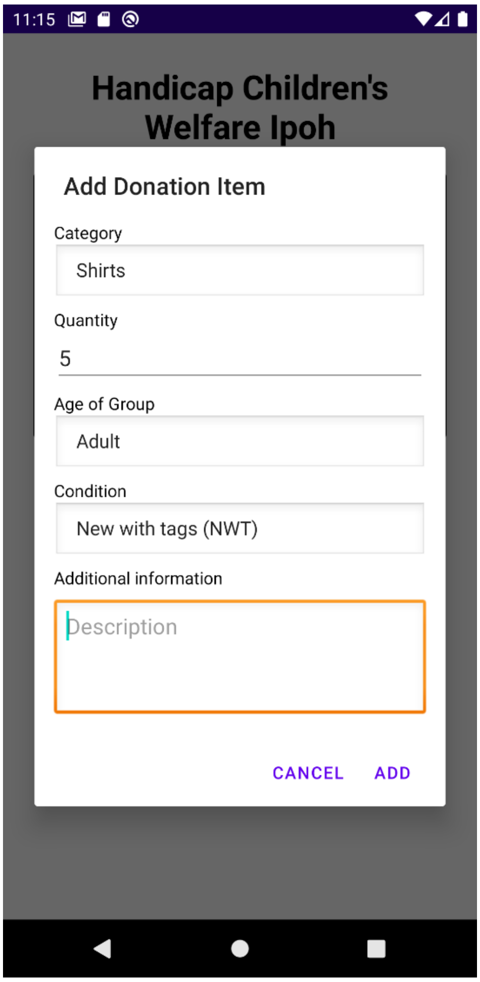


Figure 5.4.6c: Add Donation Item Form

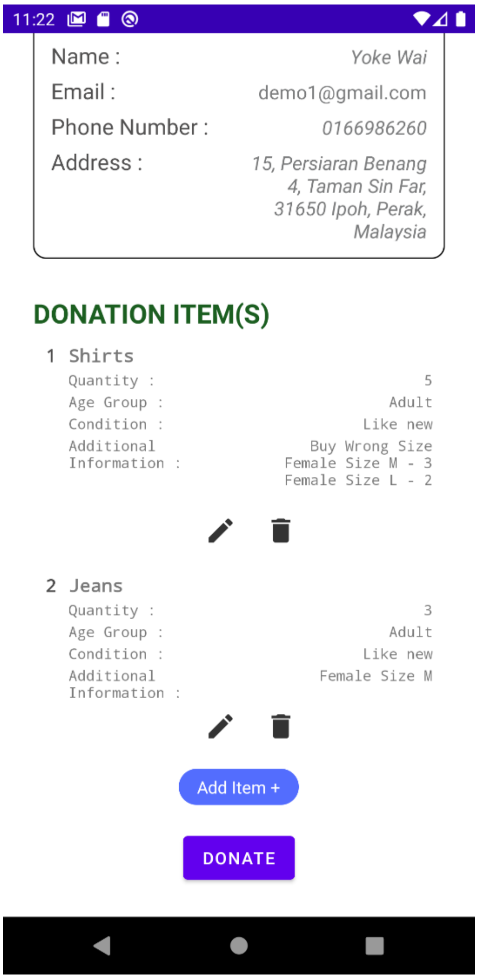


Figure 5.4.6d: Donation Item List

Figure 5.4.6c, titled 'Add Donation Item Form', and Figure 5.4.6d, titled 'Donation Item List', detail the process of adding and managing donation items. Within the Donation Item(s) list section, there's an 'Add Item+' button. Upon pressing it, the 'Add Donation Item' form is revealed, prompting the user to specify details such as category, quantity, age group, item condition, and any additional information. Once these fields are completed, clicking 'Add' transfers the specified item to the Donation Item list, as depicted in Figure 5.4.6d.

Every item within this list provides two operational buttons: 'edit' and 'delete'. The 'edit' button unveils the 'Edit Donation Item' form, letting users modify item specifics. Conversely, the 'delete' button facilitates the immediate removal of an item from the list.

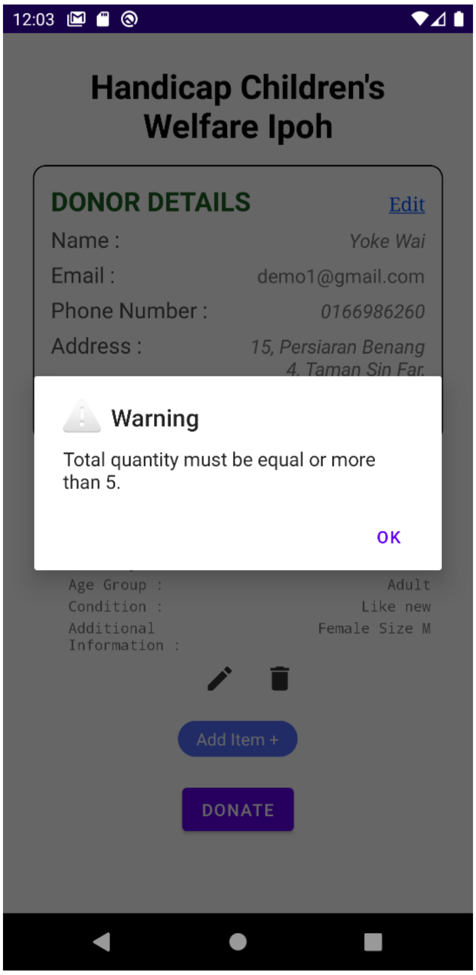


Figure 5.4.6e: Warning Message 1

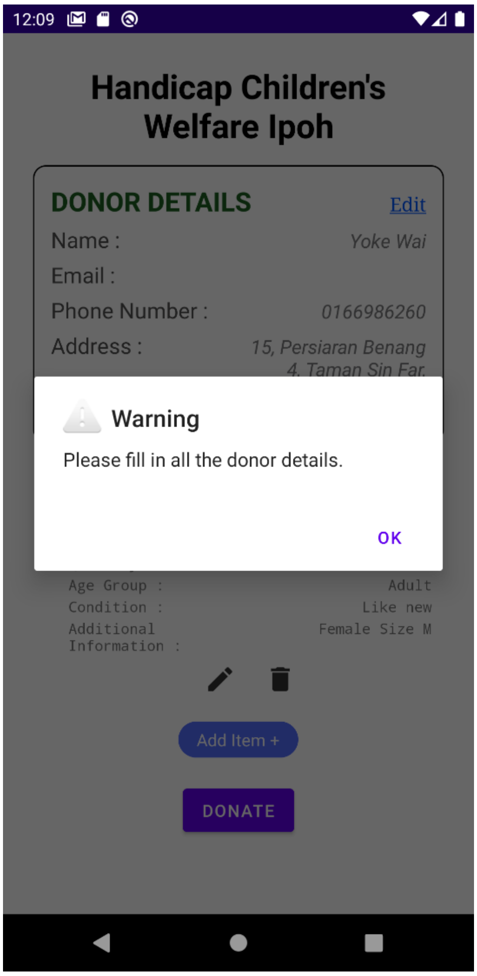


Figure 5.4.6f: Warning Message 2

Figure 5.4.6e, titled 'Warning Message 1', and Figure 5.4.6f, titled 'Warning Message 2', depict the system's mechanisms for ensuring proper donation submission. If the cumulative quantity of all donation items in the list doesn't reach a minimum of 5, Figure 5.4.6e illustrates the warning message that emerges, notifying the user that the total quantity should be at least 5 items. Additionally, should there be any missing information in the donor details (for instance, an omitted name), the system will trigger the warning displayed in Figure 5.4.6f, directing the user to fill in all necessary donor details before proceeding.

5.4.7 Donation Request Status Screen

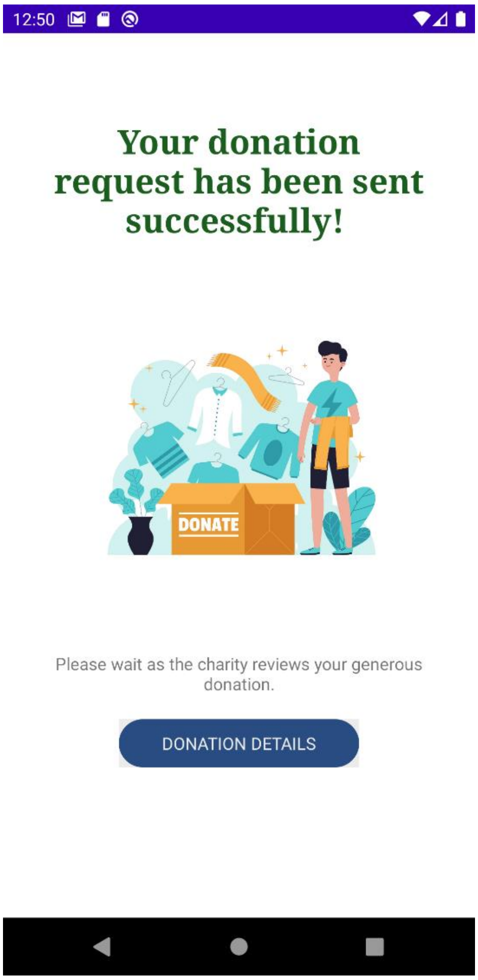


Figure 5.4.7a: Donation Pending Screen

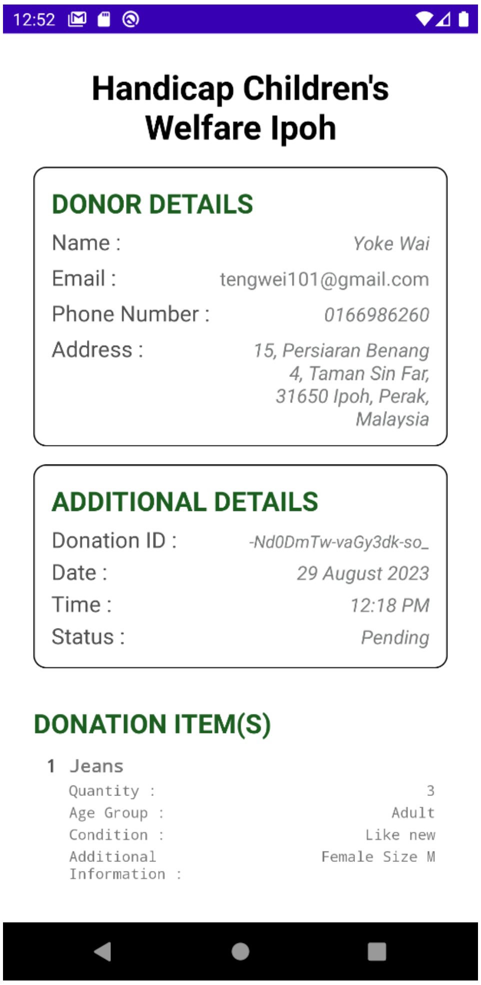


Figure 5.4.7b: Donation Request Detail

Upon successfully submitting a donation request to the designated charity, users are transitioned to the 'Donation Pending Screen', as showcased in Figure 5.4.7a. This screen serves as a confirmation, reassuring the user that their request has reached the charity and is pending review. For users eager to revisit the specifics of their donation, the screen features a "Donation Details" button. When accessed, it presents a comprehensive view of the request, as depicted in Figure 5.4.7b. This detailed breakdown includes pivotal data such as the charity's name, the donor's personal information, crucial additional details like the donation's unique ID, its submission timestamp, its current status, and an itemized list of all donated goods.

Figure 5.4.7c: Donation Rejected Screen

In cases where a charity chooses to decline a donation request, users are navigated to the 'Donation Rejected Screen', as depicted in Figure 5.4.7c. This interface offers clarity by displaying the specific rationale behind the rejection. It prominently features the title outlining the primary reason, accompanied by a more detailed description that provides further insights into the charity's decision.

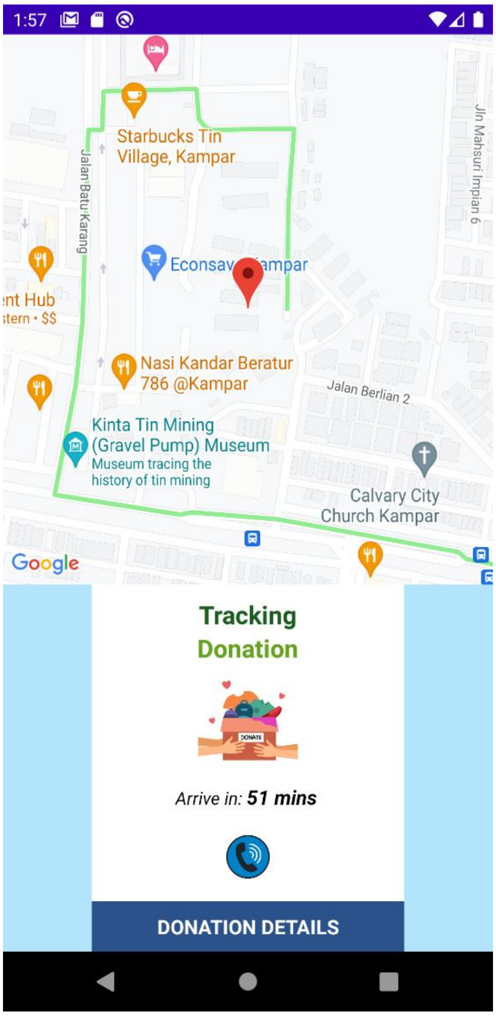


Figure 5.4.7d: Donation Accepted Screen

When a charity accepts the donation request, users are taken to the 'Donation Accepted Screen', illustrated in Figure 5.4.7d. This screen is designed to keep donors informed every step of the way. Central to the screen is a live Google Map that tracks and showcases the real-time route of the delivery driver as they make their way to the donor's location. Additionally, the screen provides a real-time Estimated Time of Arrival (ETA) so users can anticipate the driver's presence. For added convenience, a phone call button is embedded, enabling users to directly call the driver should they need to convey any pertinent information. For a holistic view of the donation, the 'Donation Details' button situated at the bottom can be accessed, leading users to the specifics of their donation request as seen in Figure 5.4.7b.

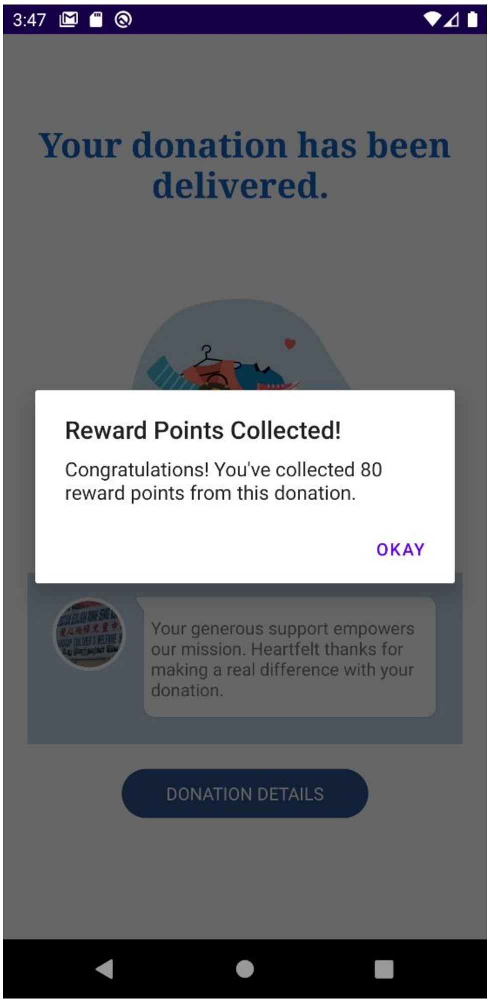


Figure 5.4.7e: Reward Points Message

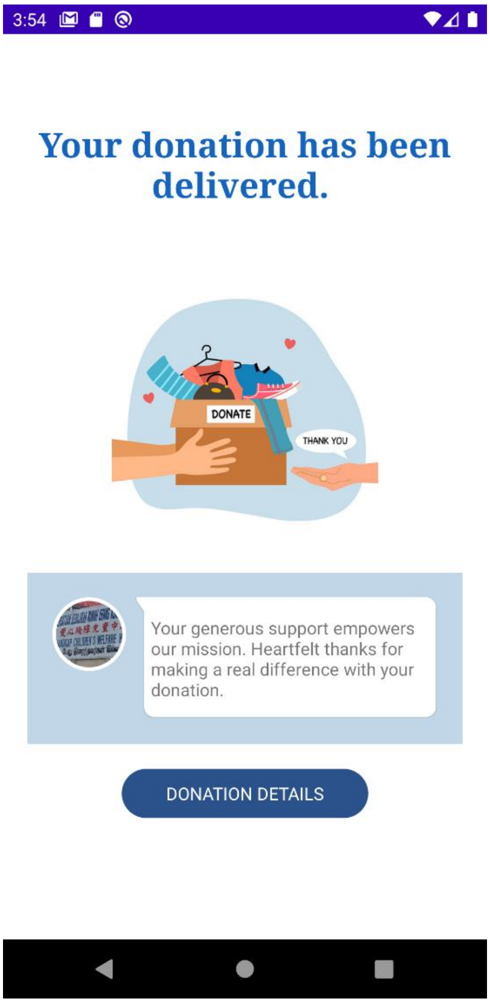


Figure 5.4.7f: Delivered Success Screen

Upon the successful delivery of a donation, users are seamlessly navigated to the 'Delivered Success Screen', as depicted in Figure 5.4.7f. In recognition of their charitable act, a pop-up message (see Figure 5.4.7e) materializes, detailing the number of reward points earned from the donation. This screen isn't just a transactional confirmation; it's an acknowledgment of the donor's generosity. It prominently displays a heartfelt message of gratitude from the respective charity organization, thanking the user for their invaluable contribution.

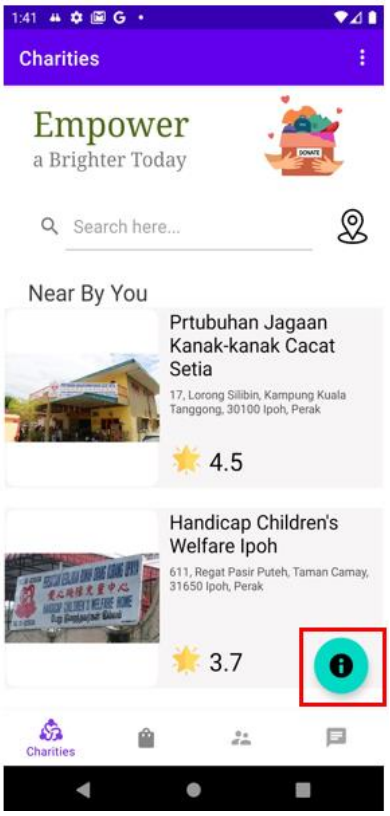


Figure 5.4.7g: Donation Status Button

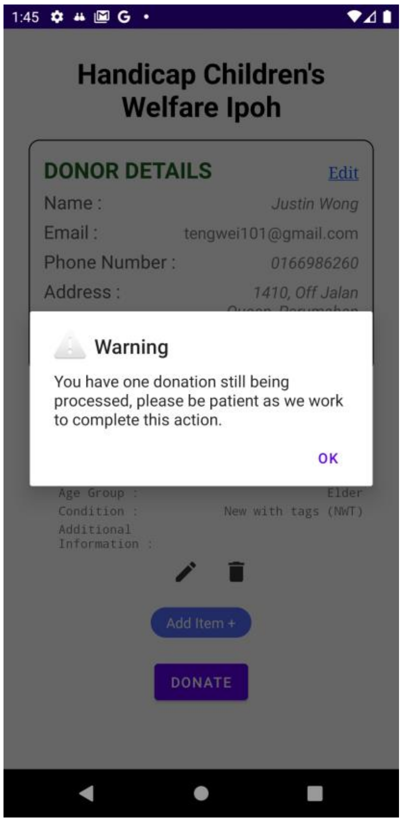


Figure 5.4.7h: Warning Message 3

The Donation Status Button (see Figure 5.4.7g) is not only a testament to the app's emphasis on real-time user engagement but also to its meticulous design considerations that prioritize user experience. After a user submits a donation request and wanders into other segments of the app, any change in the donation's status triggers an instant notification to the user, ensuring they remain abreast of the process.

Interestingly, the system integrates a dual-check mechanism regarding the visibility of the Donation Status Button. This button remains visible until two conditions are met: firstly, the donation request reaches a definitive status, either being 'completed' or 'rejected'; and secondly, the user actively engages with the button to view the updated status. Once a user clicks on this button to review the status and subsequently navigates away, the button delicately recedes from the user interface, becoming invisible.

Furthermore, to maintain processing clarity, the system is coded to prevent overlapping donation requests. If a user is tempted to submit a new request while another is pending, a prompt alert is displayed, referencing Figure 5.4.7h, which tactfully communicates: "You have one donation still being processed, please be patient as we work to complete this action." Such meticulously thought-out features not only streamline the user experience but also ensure that users are constantly informed, reducing potential misunderstandings or undue anxieties about their donation's status.

5.4.8 Profile Screen

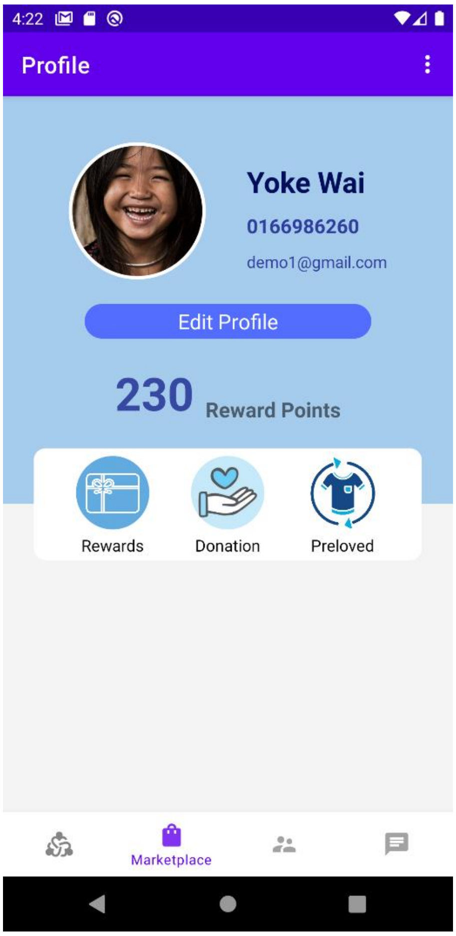


Figure 5.4.8a: Profile Screen

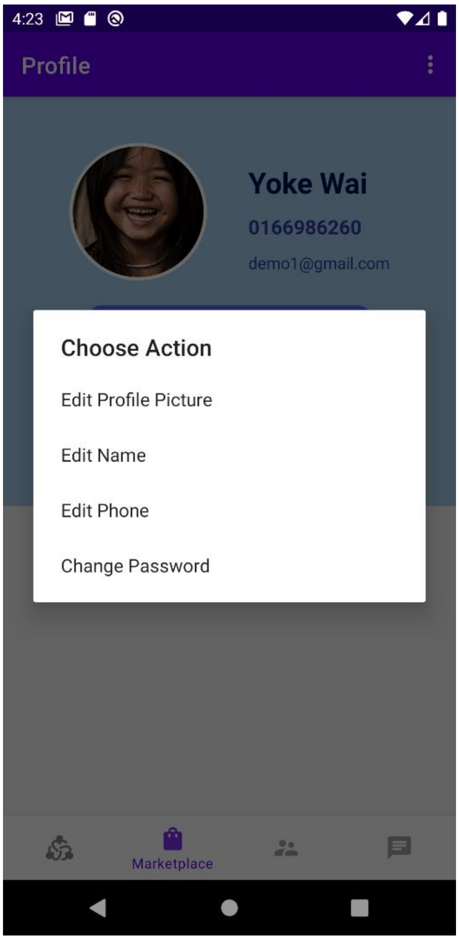


Figure 5.4.8b: Edit Profile Dialog

On accessing the Profile Screen (as illustrated in Figure 5.4.8a), users are presented with a neat overview of their personal details, including their username, phone number, and email. Additionally, a dynamic display of the user's accumulated Reward Points occupies a prominent spot on this screen, serving as a reminder of their charitable endeavors. To enhance navigation, three buttons labeled 'Rewards', 'Donation', and 'Preloved' are strategically positioned. When clicked, these buttons smoothly transition users to their respective pages.

For those seeking to update or amend their personal details, an 'Edit Profile' button is available. Clicking this button triggers a dialog (featured in Figure 5.4.8b) that offers multiple options: users can opt to refresh their profile picture, modify their name or phone number, or undertake a password change, ensuring that users retain complete control over their account information at all times.

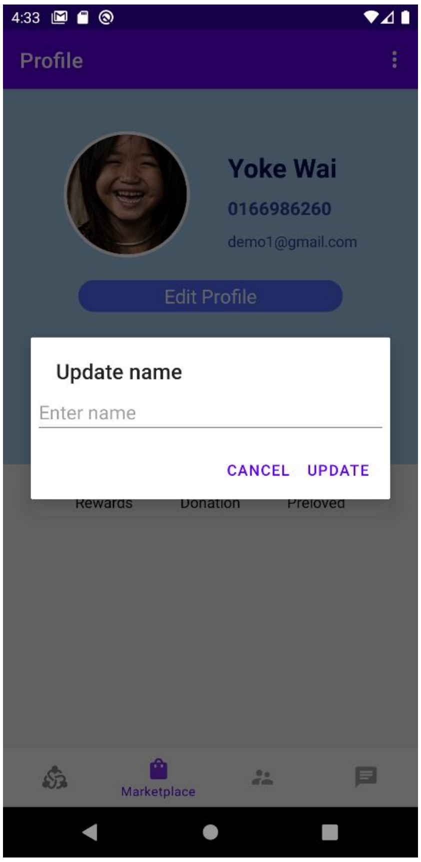


Figure 5.4.8c: Update Name Dialog

For instance, if a user wishes to update their name, they can select the "Edit Name" option, prompting a new dialog box for them to input their desired name. Once the user clicks "Update," the system proceeds to modify the name in Firebase. Upon successful update, the system will display a confirmation message to notify the user of the successful name change.

5.4.9 Rewards Screen

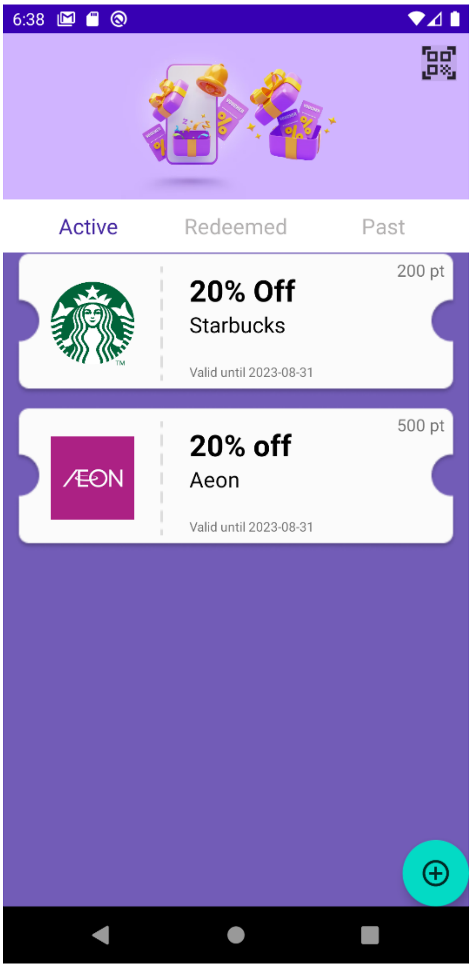


Figure 5.4.9a: Rewards Screen

In the Profile Screen, upon selecting the Rewards icon (referenced in Figure 5.4.8a), users are transitioned to the Rewards Screen, as depicted in Figure 5.4.9a. This screen is intuitively segmented into three distinct sections: 'Active', 'Redeemed', and 'Past'. These sections have been specifically curated to provide users with an organized overview of the various rewards based on their current status.

The 'Active' section showcases the rewards currently available for users to redeem. As the name suggests, the 'Redeemed' section is dedicated to displaying the rewards that the user has already claimed. Lastly, the 'Past' section provides a catalog of rewards that have now expired, offering users a glimpse into past opportunities.

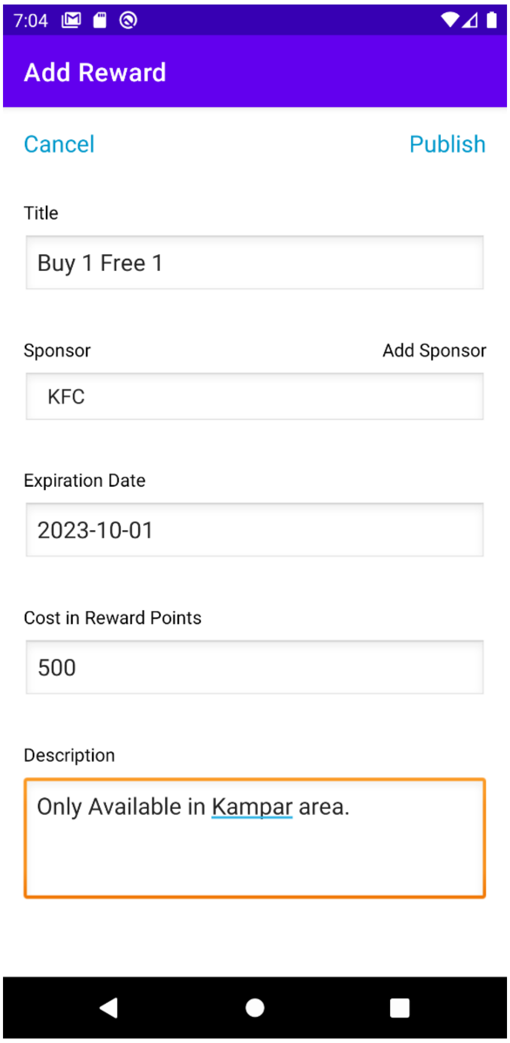


Figure 5.4.9b: Add Rewards Form

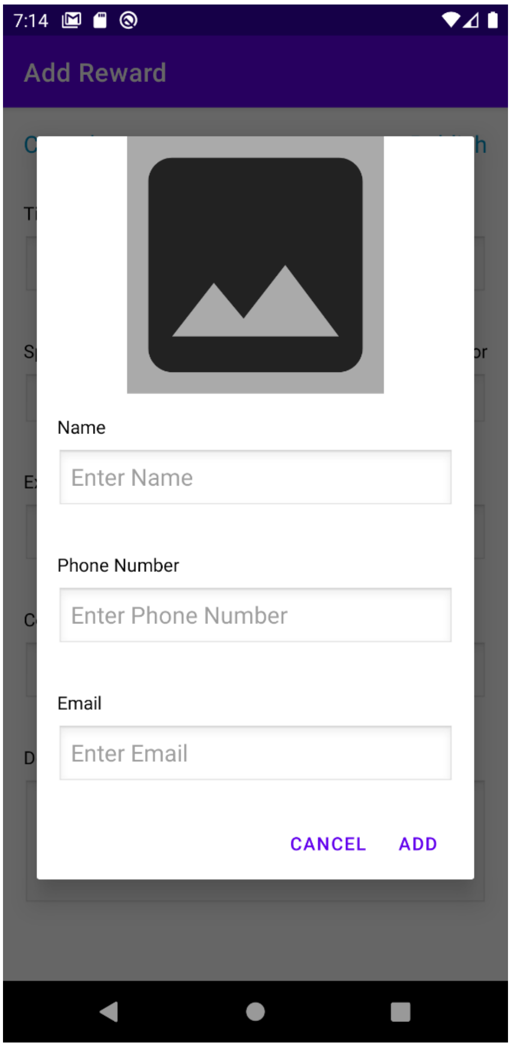


Figure 5.4.9c: Add Sponsor Form

In the Rewards Screen (see Figure 5.4.9a), an additional feature is made available for administrative users. An icon positioned at the bottom right of the screen serves as an interface to add new rewards. Once this icon is tapped, users are navigated to the 'Add Reward' form, as showcased in Figure 5.4.9a. This form is comprehensive, with designated fields for the reward title, sponsor, expiration date, cost in reward points, and a description.

The 'Expiration Date' field comes equipped with an interactive calendar feature. When the admin clicks on this field, a calendar pops up, facilitating the easy selection of the desired expiration date. Adjacently, the 'Sponsor' field presents a dropdown list, enabling admins to select from a list of collaboration sponsors.

Adding a unique touch, there's an 'Add sponsor' text button right next to the 'Sponsor' field. Should the admin opt to tap this, an 'Add Sponsor' form, depicted in Figure 5.4.9c, emerges. This form is designed for the input of key sponsor details: their logo, name, contact phone number, and email. Post completion, when the 'Save' button is clicked, the newly added sponsor's details are stored in the system's database. Consequently, the sponsor dropdown in the 'Add Reward' form is updated, making the newly added sponsor available for selection.

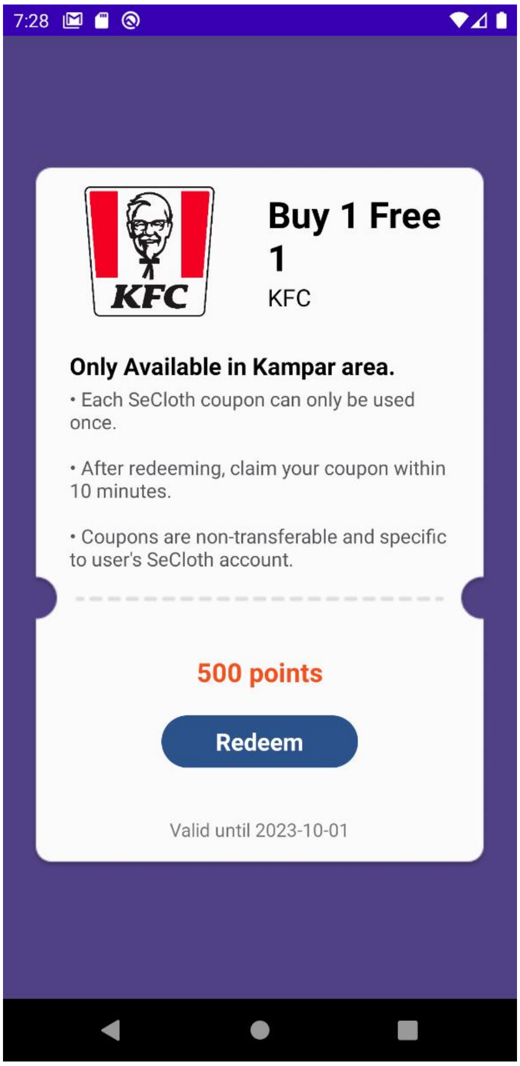


Figure 5.4.9d: Reward Detail Screen

In the Rewards Screen, users have the ability to delve deeper into the specifics of any reward by simply tapping on it from the rewards list, as depicted in Figure 5.4.9a. Once a reward is selected, the system seamlessly navigates to its detailed view. The

'Reward Detail' screen, showcased in Figure 5.4.9d, offers a comprehensive overview of the chosen reward.

At a glance, users can view essential information such as the reward's title and its detailed description. Supporting the narrative, the sponsor's logo is prominently displayed, underscoring the collaboration that made the reward possible. Further enriching the user's understanding, the rules pertaining to the reward are listed, ensuring complete clarity. In terms of value, the cost in reward points, exemplified as '500 points', is highlighted, giving users a clear indication of the reward's worth. Facilitating immediate action, a 'Redeem' button is strategically placed, allowing users to instantly claim their desired reward. And lastly, ensuring users are aware of the reward's validity, the expiration date is prominently showcased.

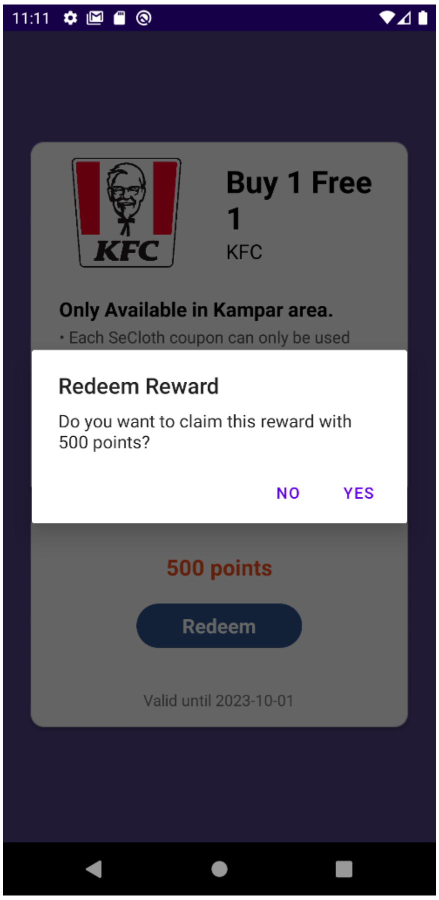


Figure 5.4.9e: Redeem Confirmation Dialog

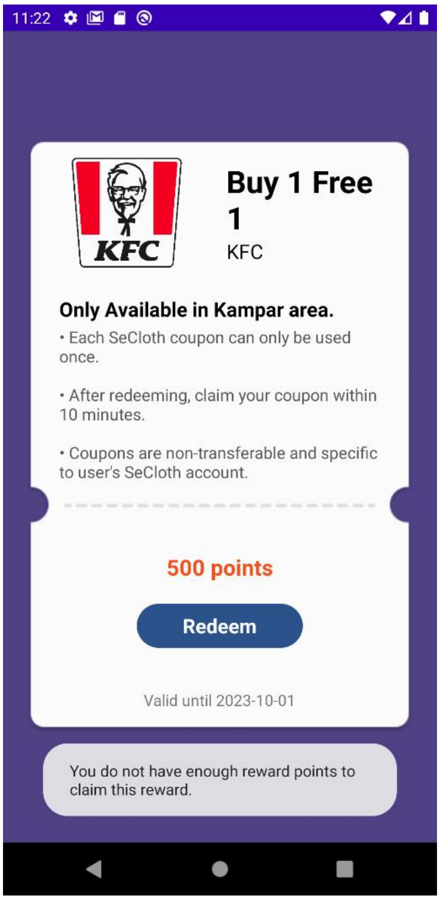


Figure 5.4.9f: Redeem Failed Message

When a user expresses interest in a particular reward by tapping the 'Redeem' button, they are immediately met with a confirmation dialog. This dialog, as illustrated in Figure 5.4.9e, poses a clarifying question: "Do you want to claim this reward with 500 points?". The intent is to ensure users are fully aware of the points they're about to spend.

However, not all redemption attempts may be successful. In scenarios where the user's accumulated points fall short of the reward's cost, the system is designed to provide immediate feedback. If a user, lacking the necessary points, opts to proceed by clicking 'yes', they will be greeted with a forthright message. This message, displayed in Figure 5.4.9f, clearly states: "You do not have enough reward points to claim this reward." This serves as a gentle reminder for users to either accrue more points or select a different reward within their current points range.

Figure 5.4.9g: Redeem QR Code

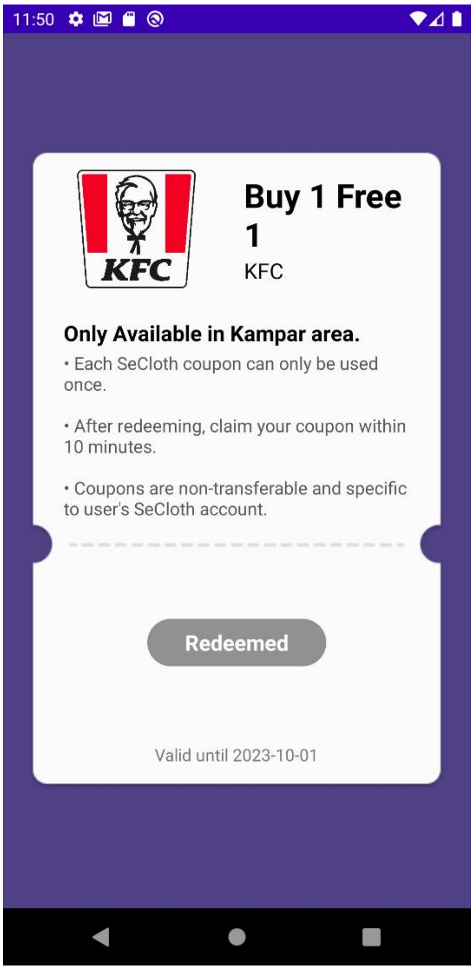


Figure 5.4.9f: Redeemed Success

When a user chooses to redeem a reward and has the requisite number of points, the standard 'Redeem' button undergoes a transformation. Instead of the familiar button, users are presented with a dynamically generated QR code that encapsulates key information: the reward id, the user id, and the current status of the reward (see Figure 5.4.9g).

Serving both as a visual indicator and a functional element, the QR code has an inherent expiration system. Directly above the QR code, users will notice a 1-minute countdown timer. This timer is designed with user convenience in mind; it continues to decrement in the background, ensuring that if users momentarily exit the application and return, they are not forced to restart the countdown from the beginning.

Upon the timer's completion or once the QR code is successfully scanned elsewhere, the reward's status transitions from "Valid" to "Redeemed". The QR code, no longer necessary, is then replaced by a 'Redeemed' button. If users, driven by curiosity or forgetfulness, tap this button post-redemption, they are met with a straightforward message: "You have redeemed this reward", as highlighted in Figure 5.4.9f. This entire sequence ensures clarity and transparency in the reward redemption process.

5.4.10 Donation History Screen

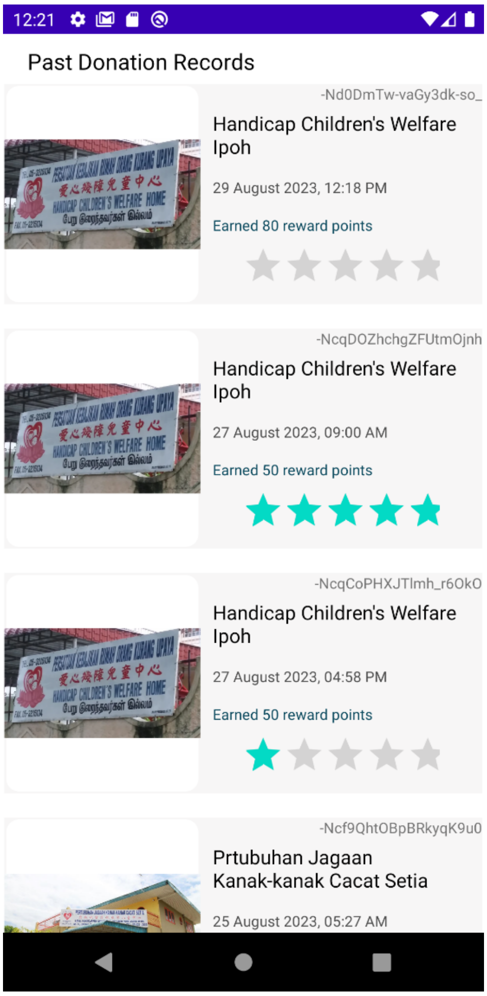


Figure 5.4.10a: Past Donation Records

Venturing into the user's history of benevolence, the Donation icon located on the profile screen (refer to Figure 5.4.8a) acts as a portal to the past donation records of the user. Clicking on this icon leads users to the dedicated screen which meticulously lists all their previous donations (as illustrated in Figure 5.4.10a).

Beyond merely showcasing their contribution history, this interface offers an interactive feature. Each past donation record is adorned with a rating system, denoted by stars ranging from 1 to 5. Users have the liberty to express their experience with each donation by selecting the number of stars they deem fit.

Upon this user interaction, the system doesn't remain static. The charity's overall rating point (highlighted in Figure 5.4.4a) undergoes recalibration. Depending on the user's rating, the charity's aggregate score is adjusted and updated in real-time, ensuring that user feedback dynamically shapes the perception of the charity within the platform.

5.4.11 Preloved Screen

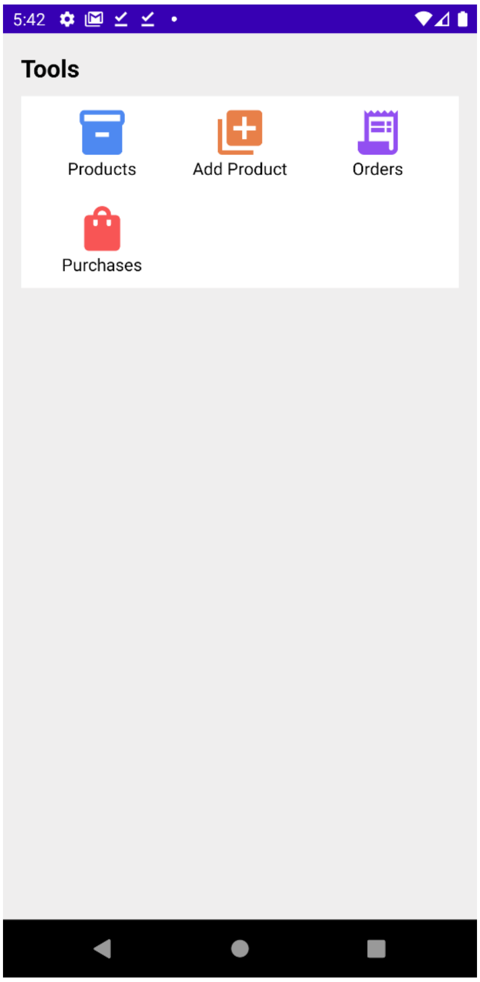


Figure 5.4.11a: Preloved Tools

Delving into the eco-conscious and sustainable segment of the platform, the Preloved icon on the profile screen serves as a gateway to the Preloved tools. When users tap on this icon, they are ushered into a hub dedicated to second-hand or 'preloved' items, as showcased in Figure 5.4.11a.

This hub is structured to offer users a multitude of functionalities. Firstly, the "Products" tool empowers users to manage and oversee items they have listed for sale in the marketplace. For those eager to add a new listing, the "Add Product" tool navigates them directly to the Sell Product Form (detailed in Figure 5.4.2b).

But it's not just about selling. To ensure seamless transactions and tracking, the "Orders" tool is in place. This tool is specially designed for users to manage and monitor orders that other users (buyers) have placed for their listed items. Meanwhile, for keeping a tab on their own shopping spree, users can leverage the "Purchases" tool. This feature provides a comprehensive view of all the purchases they've made, ensuring a holistic and transparent shopping experience.

5.4.12 Manage Products Screen

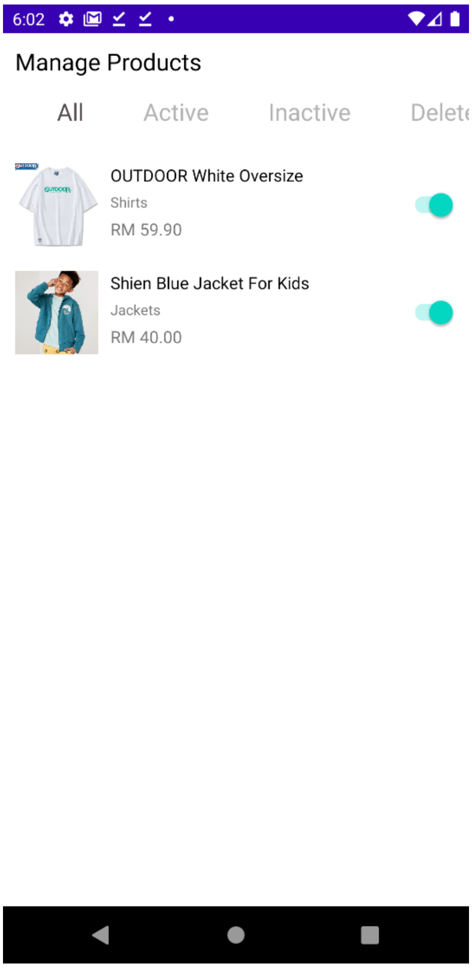


Figure 5.4.12a: Product List

Figure 5.4.12b: Deleted Product List

Figure 5.4.12a presents a comprehensive dashboard tailored for users to manage their product listings with ease and precision. This dashboard is sectioned into four distinct categories, which are All, Active, Inactive, and Deleted. Each category, as its name suggests, offers a view based on the status of the products.

- All: This section offers an umbrella view of all the products irrespective of their status.
- Active: Products that are currently visible and available for purchase in the marketplace fall under this section. Each product listed here is equipped with a toggle button. When switched on, the product remains active and visible to potential buyers. Conversely, if toggled off, the product transitions to the Inactive section.
- Inactive: This category houses products that the seller has opted to temporarily withhold from the marketplace. While not visible to potential buyers, sellers retain the flexibility to re-activate these listings by simply toggling the button back to the 'active' mode.
- Deleted: Figure 5.4.12b zooms in on this section, detailing products that have been removed by the user. Instead of a toggle button, products here carry a 'Restore' option. Should a user wish to relist a deleted product, a simple click on 'Restore' will revive the listing, placing it back in the 'Active' category. However, a clock is ticking for these products. A 30-day window post-deletion is all that's given for potential restoration. Beyond this period, the product is permanently removed from the database, marking the end of its lifecycle on the platform.

Figure 5.4.12c: Seller's Product Detail

Figure 5.4.12c offers a detailed perspective for sellers to view information about their products. By selecting any product from the Manage Product screen, as referenced in Figure 5.4.12c, sellers are directed to this detail-rich interface. While it closely mirrors the layout and details of the general Product Details Screen as depicted in Figure 5.4.3a, the Seller's Product Detail screen is enriched with added functionalities exclusively tailored for the product owner.

One unique aspect of this screen is the numerical indicator positioned next to the heart icon. This figure offers a real-time count of how many users have marked this product as their favorite, providing valuable insights into the product's popularity and appeal to potential buyers.

But the Seller's Product Detail screen is not just for passive viewing. It also integrates interactive 'Edit' and 'Delete' buttons to give sellers direct control over their listings. The 'Edit' button enables sellers to adjust details, modify pricing, or refresh the product's images, ensuring the listing remains current and accurate. In contrast, the 'Delete' button provides a straightforward method for sellers to eliminate products they no longer wish to offer, streamlining their product management experience."

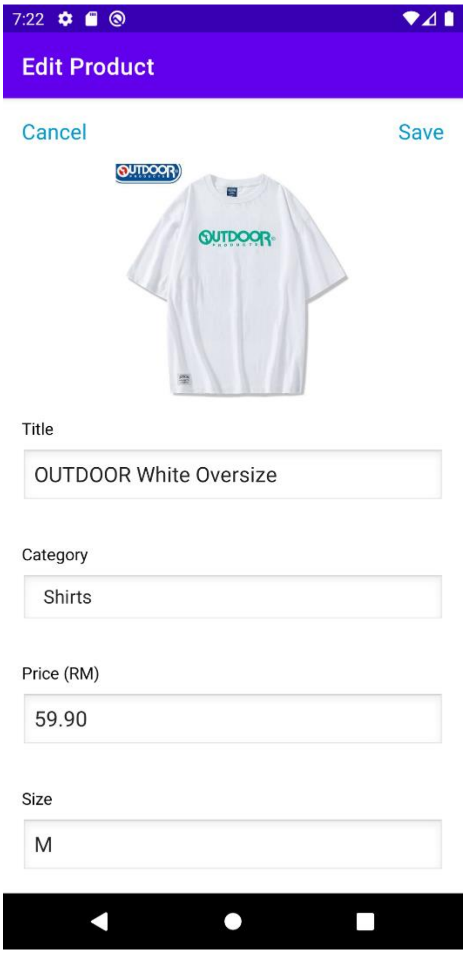


Figure 5.4.12d: Edit Product Form

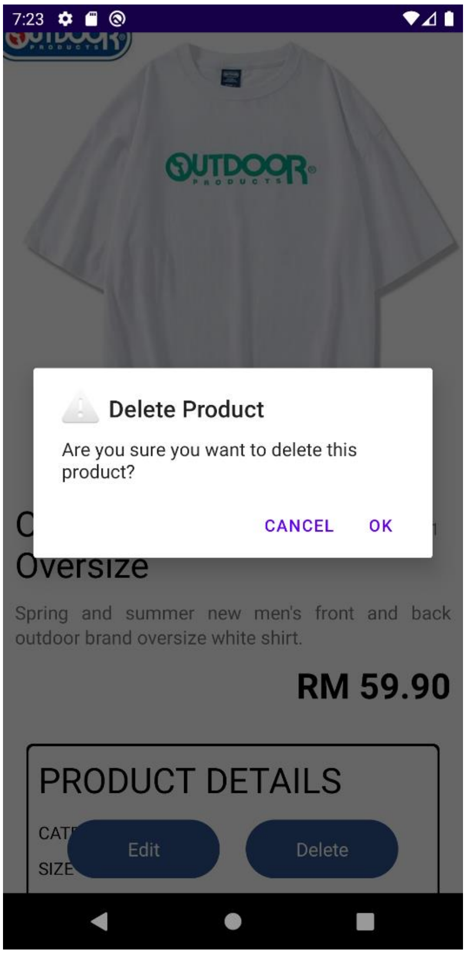


Figure 5.4.12e: Delete Product Dialog

In the ever-evolving marketplace of the platform, sellers have the flexibility to manage their products with ease. When a user wants to make changes to a listed product, they simply click on the "Edit" button. This action prompts the system to guide the user to the "Edit Product Form", as depicted in Figure 5.4.12d. For a seamless editing experience, all the fields in this form are pre-populated with the product's existing details. This allows the seller to clearly see the current information and make any desired adjustments. Once the seller makes their changes and ensures that all the mandatory fields are completed, they can finalize their modifications by hitting the

"Save" button. This not only updates the product details for the seller but also reflects these changes in the marketplace, ensuring all potential buyers view the most up-to-date product details.

On the other hand, if a seller decides to remove a product from the marketplace, they can easily do so by tapping the "Delete" button. This action triggers a confirmation dialog, as illustrated in Figure 5.4.12e, ensuring that the seller genuinely intends to remove the product. Upon confirmation, the product's status is updated to "Deleted". Instead of being removed immediately, the product is relocated to the "Deleted" section, offering sellers an additional layer of flexibility should they decide to restore the listing in the future.

5.4.13 Orders Screen

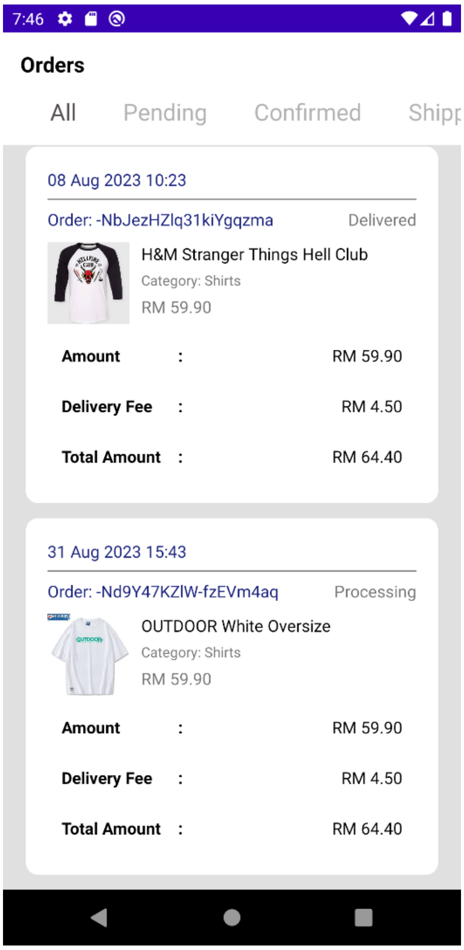


Figure 5.4.13a: Order List

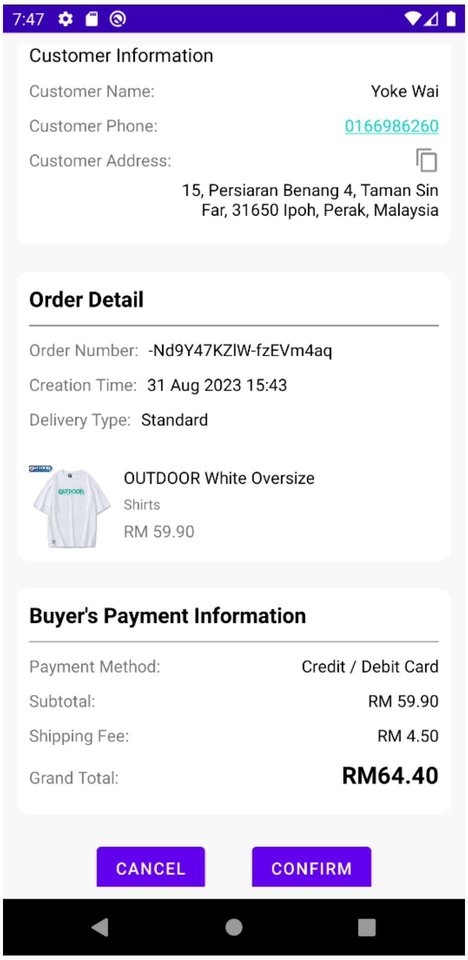


Figure 5.4.13b: Order Detail

Navigating through the Preloved Tools, as referenced in Figure 5.4.11a, users have the opportunity to gain insights into their sales metrics via the Order icon. Clicking on this icon whisks users away to an organized Orders screen, as portrayed in Figure 5.4.13a. This screen elegantly breaks down orders into six specific categories for ease of management: All, Pending, Confirmed, Shipped, Delivered, and Canceled. Each section is meticulously crafted to showcase orders that align with its designated status. Moreover, to aid users in their financial assessments, every order is accompanied by the total amount the buyer has remitted.

Diving deeper into the order particulars, users can simply click on an individual order. This action reveals a comprehensive Order Detail page, as illustrated in Figure 5.4.13b. At the forefront, customer information is presented, encompassing the buyer's name, contact number, and complete address, ensuring sellers have all requisite details for seamless communication and dispatch. Following this, the system dives into the nitty-gritty of the order. It unfurls details like the order ID, the precise time of order placement, the chosen mode of delivery, and an exhaustive breakdown of the products within the order. Bringing the screen to its conclusion, the Buyer's Payment Information is delineated at the bottom. This section unveils the mode of payment, the product subtotal, any accompanying shipping fees, and culminates with the grand total, giving the seller a holistic understanding of the financial aspects of the transaction.

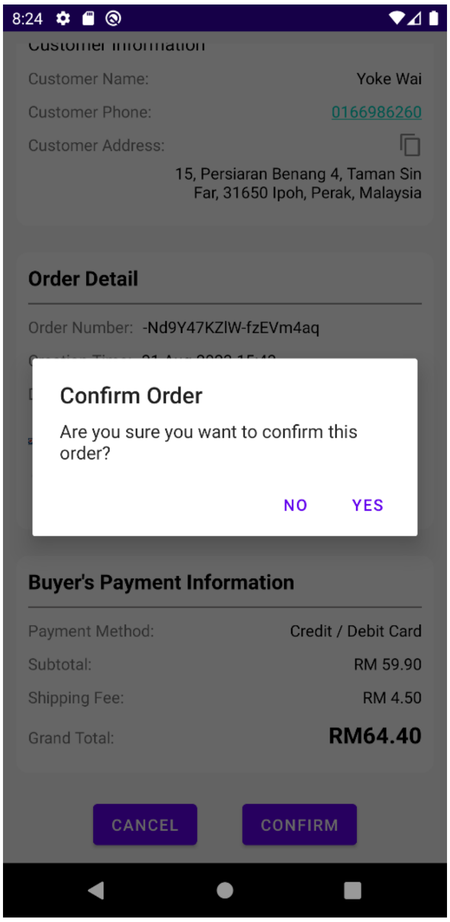


Figure 5.4.13c: Confirm Order Dialog

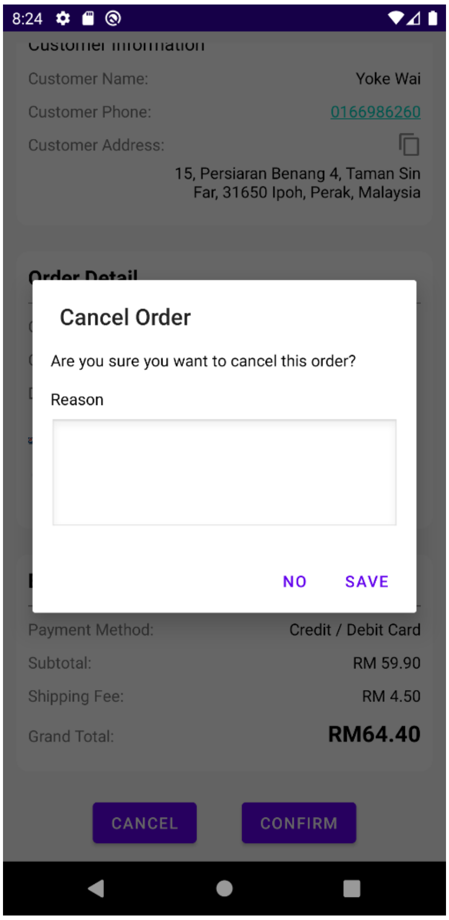


Figure 5.4.13d: Cancel Order Dialog

Upon inspecting an order in the Processing status on the order detail screen, users are provided with two distinct options embodied by the Cancel and Confirm buttons located at the bottom of the screen.

Selecting the Cancel button triggers a dialog, as represented in Figure 5.4.13d. This dialog isn't just a mere cancellation prompt; it actively seeks input from the seller regarding the reason for the cancellation. Such feedback is crucial not just for record-keeping but also for enhancing the transparency between sellers and buyers. After penning down their reason and subsequently pressing the save option in the dialog, the system meticulously logs the reason in the database. Following this action, the order status metamorphoses from Processing to Canceled.

On the flip side, if the user chooses the Confirm button, a different dialog, depicted in Figure 5.4.13c, materializes on the screen. This dialog is an affirmation checkpoint, asking the user to solidify their decision to confirm the order. A simple affirmation here results in a swift transition of the order status, taking it from Processing to its next phase, Confirmed. This organized process ensures that sellers have full autonomy and clarity over their actions, making for a user-friendly experience.

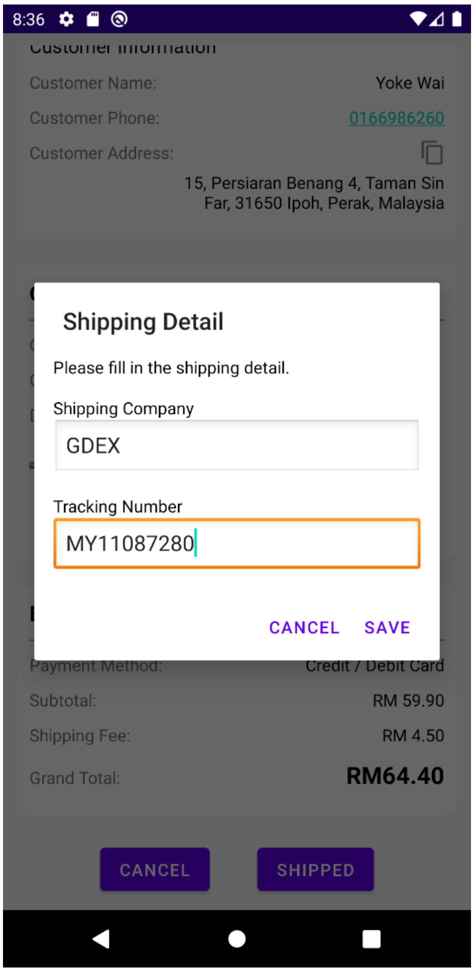


Figure 5.4.13e: Shipping Detail Form

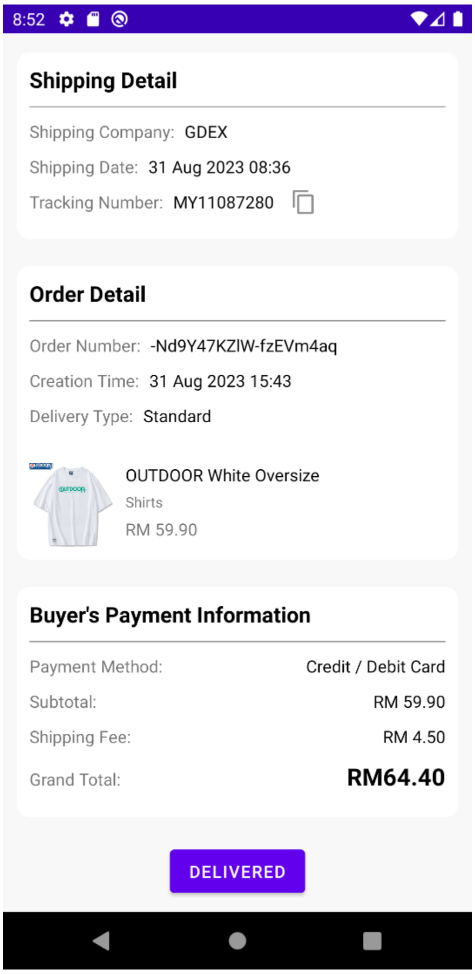
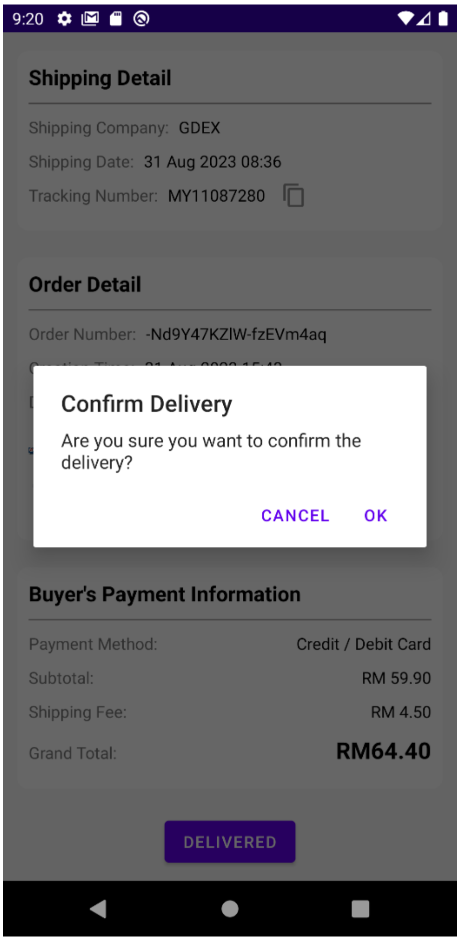


Figure 5.4.13f: Shipping Detail

Upon an order's status transition to 'Confirmed', sellers are given the option to update the shipping details. By clicking the 'Shipped' button on the Shipping Detail Form, which is depicted in Figure 5.4.13e, they're presented with a form. This form allows them to enter information about the shipping company and the tracking number, ensuring both the seller and buyer can keep track of the shipment status.

Following the successful submission of these shipping details, the order's status changes from 'Confirmed' to 'Shipped'. The order detail view now presents a new section titled "Shipping Detail", as shown in Figure 5.4.13f. This section contains pertinent shipping information like the name of the shipping company, the shipment date, and the tracking number. For ease of access, a 'Copy' button is placed next to the tracking number, allowing sellers and buyers to conveniently copy this number to their clipboard. This feature is especially useful, as it simplifies the process of tracking shipments on external platforms or websites.

With the order status now reflecting 'Shipped', the interface undergoes another change. The 'Cancel' and 'Shipped' buttons disappear, being replaced by a single 'Delivered' button. Sellers are then expected to press this button once they receive confirmation of the parcel's successful delivery.



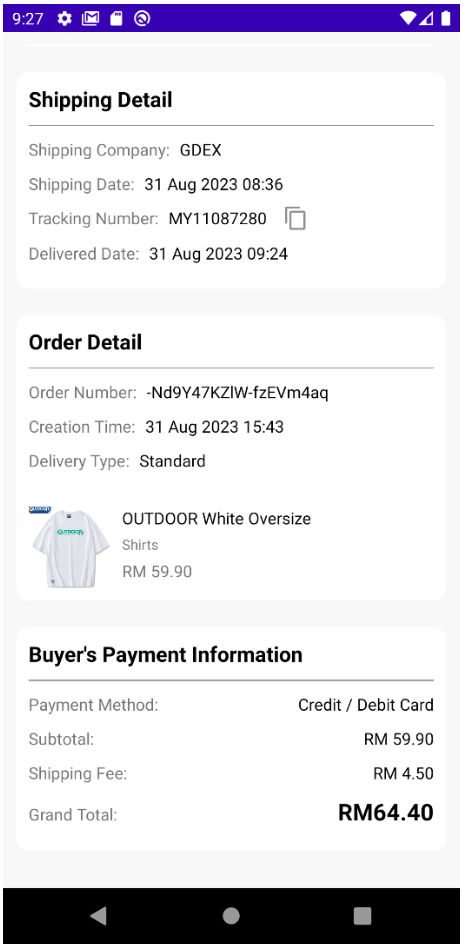


Figure 5.4.13g: Confirm Delivery Dialog *Figure 5.4.13h: Delivered Order Detail*

Upon clicking the 'Delivered' button, a Confirm Delivery Dialog (Figure 5.4.13g) appears. If the seller confirms, the order status updates from 'Shipped' to 'Delivered'. This is visible in the Delivered Order Detail (Figure 5.4.13h), where a 'Delivered Date' is added, marking the exact moment of the seller's confirmation. Once confirmed, all action buttons disappear, signifying the completion of the order's journey.

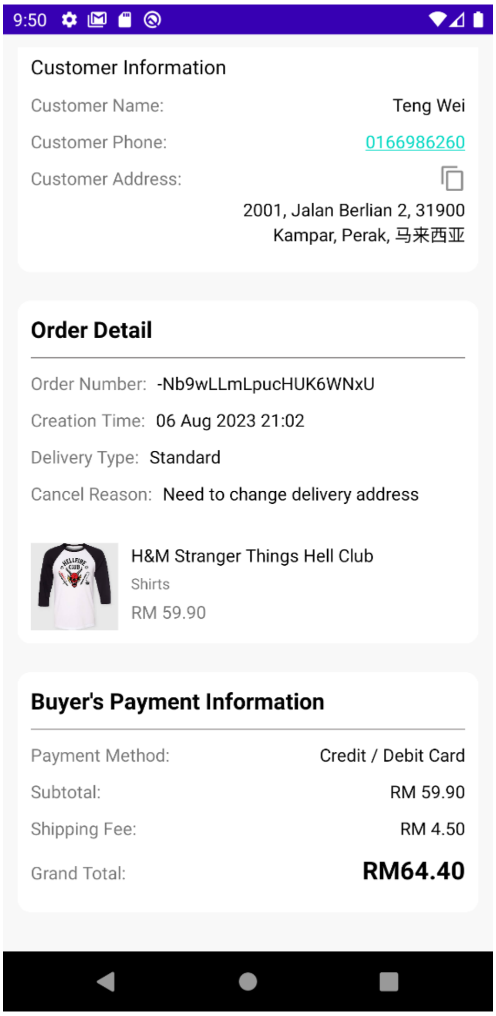


Figure 5.4.13i: Cancelled Order Detail

In Figure 5.4.13i, "Cancelled Order Detail", when an order is cancelled, a new field labeled "Cancel Reason" is introduced. This provides insight into the rationale behind the order's cancellation.

5.4.14 Purchases Screen

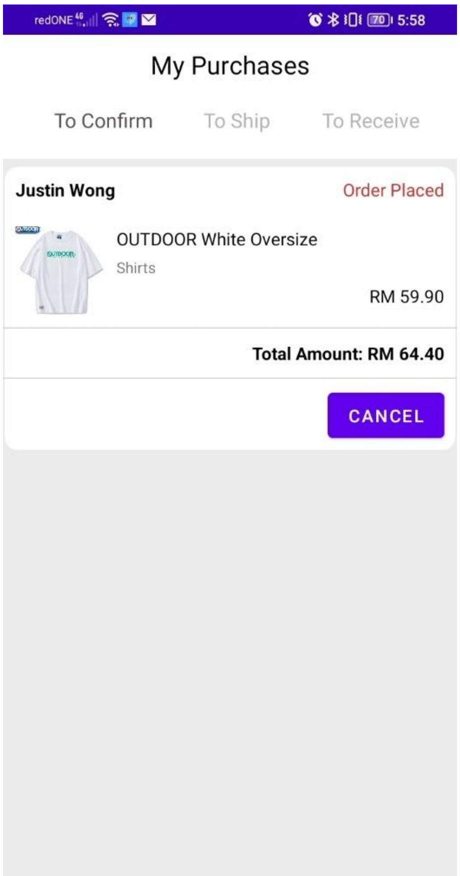


Figure 5.4.14a: Purchases List

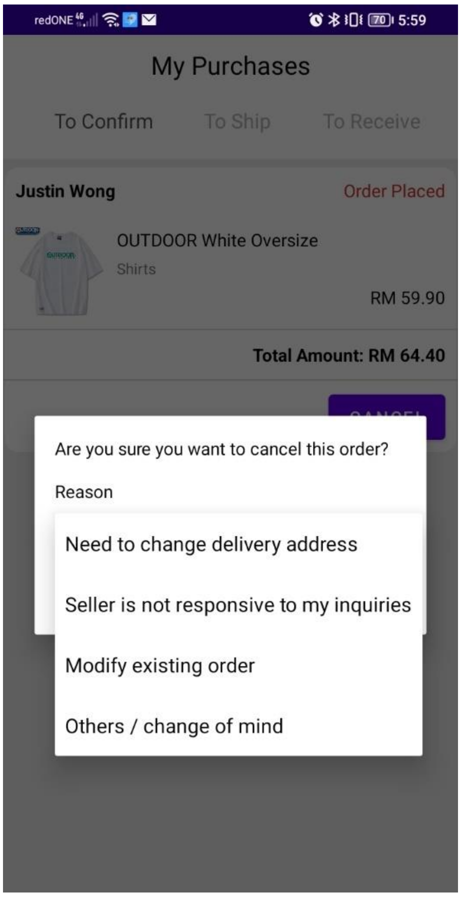


Figure 5.4.14b: Cancel Reason Dialog

In Figure 5.4.14a, titled "Purchases List," when users access the Preloved Tools (refer to Figure 5.4.11a) and select the purchases icon, they are navigated to the Purchases Screen. This screen categorizes purchase records into five sections based on status: "To Confirm", "To Ship", "To Receive", "Completed", and "Cancelled."

Figure 5.4.14b, named "Cancel Reason Dialog," appears when users opt to cancel a purchase via the cancel button from the previous figure. The dialog provides a dropdown list of reasons for cancellation. Users can select their reason and confirm the cancellation by clicking "save," as long as the item hasn't been shipped by the seller yet.

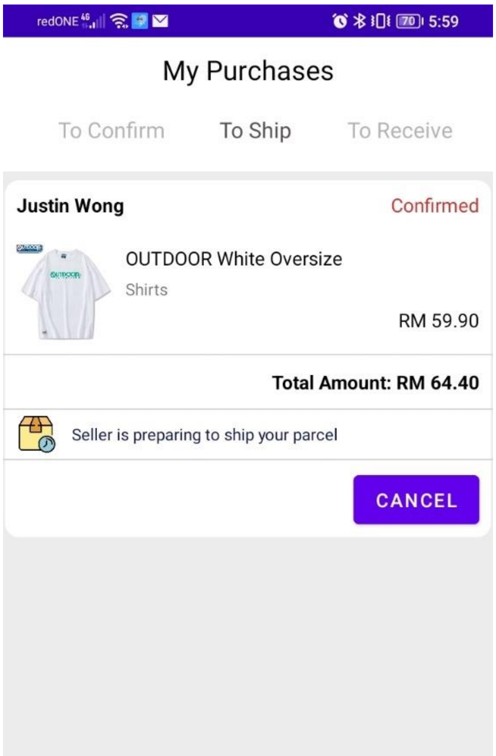


Figure 5.4.14c: To Ship List

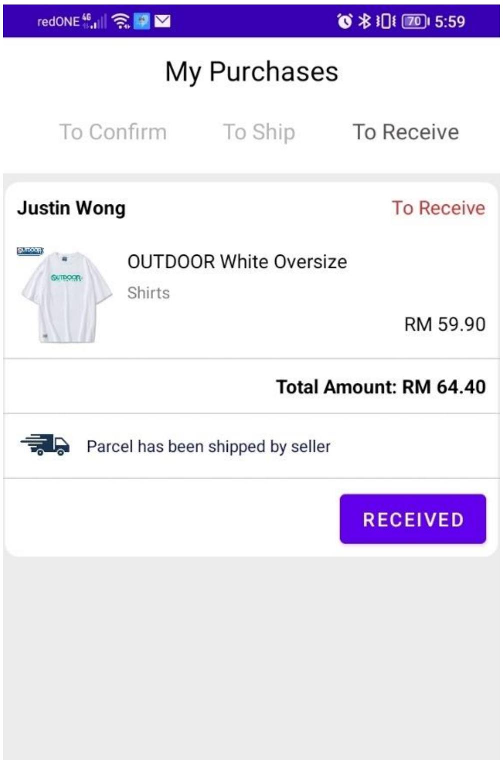


Figure 5.4.14d: To Receive List

In Figure 5.4.14c, titled "To Ship List," users can view purchases that have been confirmed by the seller, signified by the "Confirmed" status. These records display a message, "Seller is preparing to ship your parcel," indicating that the product is in preparation for shipment. Additionally, the status text, initially reading "Order Placed," transitions to "Confirmed."

Figure 5.4.14d, named "To Receive List," showcases purchases with a "Shipped" status, meaning they have already been dispatched by the seller. A descriptive message, "Parcel has been shipped by seller," is prominently displayed. Users have the ability to delve into the shipping details, as referenced in Figure 5.4.13f, providing insights into the shipping company, shipping date, and tracking number. Notably, the initial "cancel" option morphs into a "Received" button, allowing users to manually update the status to "Received" once they get their package.

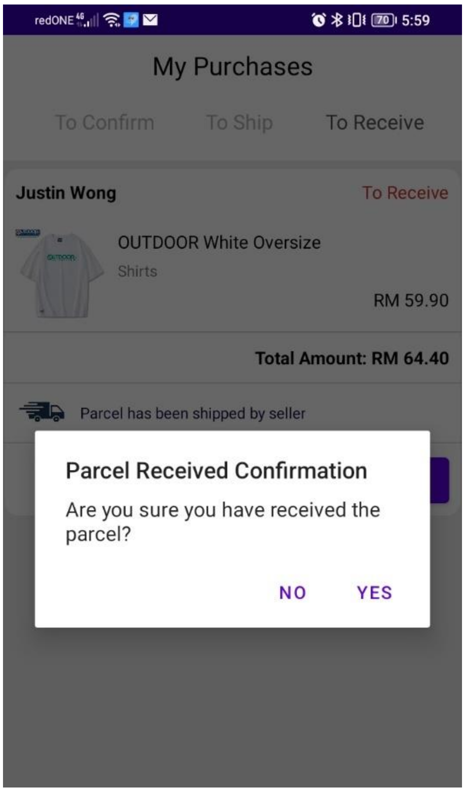


Figure 5.4.14e: Received Confirmation

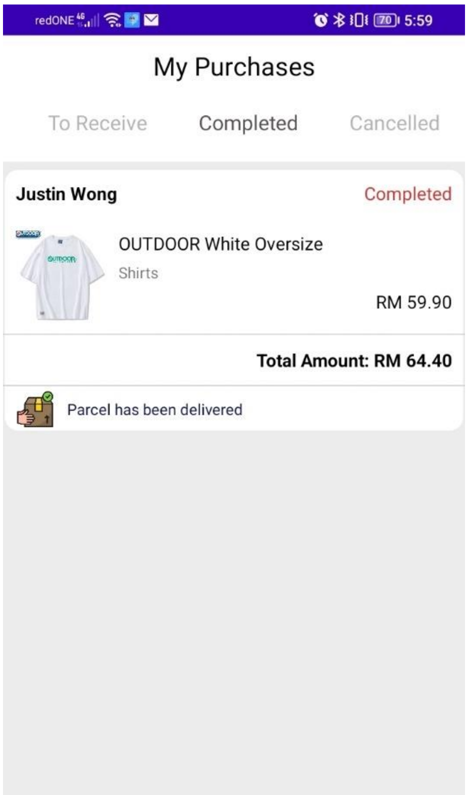


Figure 5.4.14f: Completed List

In Figure 5.4.14e, titled "Received Confirmation," when users select the "Received" button, they are presented with a confirmation dialog. Should they confirm with a "yes," the status of their order transitions from "Shipped" to "Received."

This updated status then takes the user to Figure 5.4.14f, the "To Completed List." Here, purchases that have been successfully received are displayed. A notification reading "Parcel has been delivered" prominently alerts the user of the status change. Concurrently, the status label evolves from "To Receive" to "Completed." Notably, upon reaching this completed state, all action buttons disappear, marking the end of the transaction process.

5.4.15 Charity Homepage

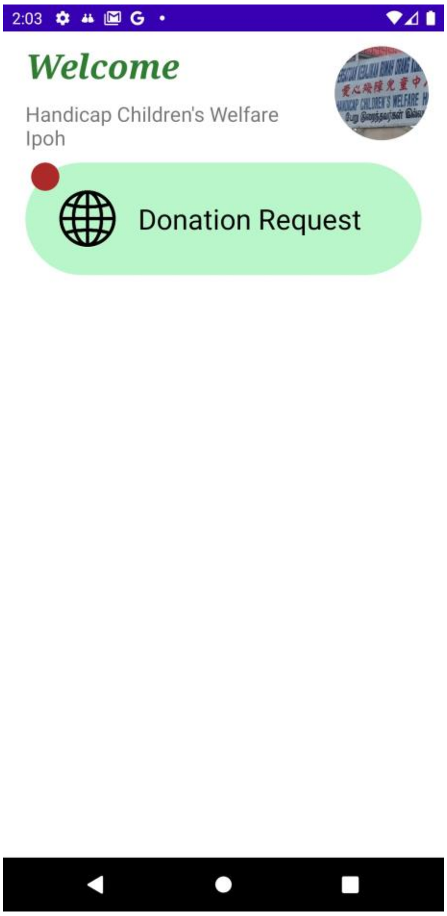


Figure 5.4.15a: Charity Homepage

After logging in with a registered charity email, users are directed to the Charity Homepage as shown in Figure 5.4.15a. This homepage prominently displays the account's profile picture and the associated charity's name. Directly below, a menu presents various options, with 'Donation Request' taking precedence. A red circle indicator on this option signifies an incoming donation request, alerting the charity immediately. This intuitive design ensures charities quickly notice and act upon new requests, enhancing overall efficiency and responsiveness.

5.4.16 Charity's Donation Request

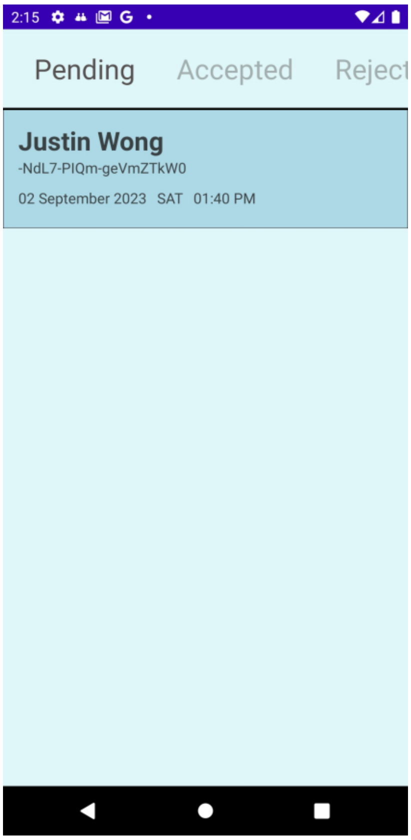
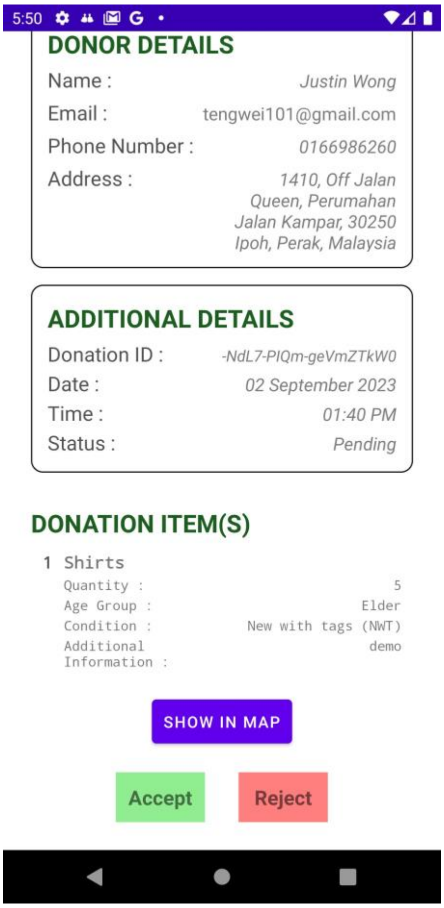


Figure 5.4.16a: Donation Request List

Upon selecting the 'Donation Request' option, charities are guided to the comprehensive donation request list. This list is conveniently segmented into five categories: Pending, Accepted, Rejected, Done, and All, streamlining the tracking of requests based on their current status. Each entry in the list provides essential details about the donation, including the donor's name, the unique donation ID, and the timestamp of when the donation was initiated. This organized layout ensures that charities can effortlessly monitor and manage donation requests in real time.



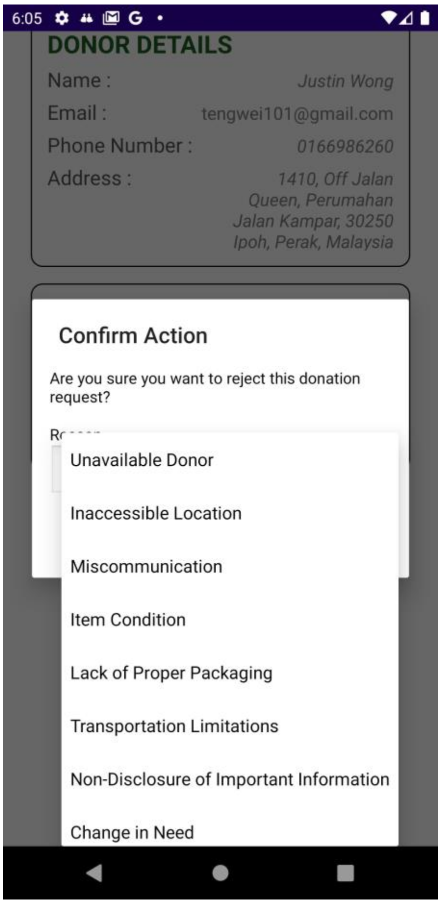


Figure 5.4.16b: Pending Request

Figure 5.4.16c: Reasons of Rejection

Upon selecting a specific request, charities are taken to a detailed donation page. For those donations still in a 'Pending' state, three distinct options are displayed at the bottom: "Show in map", "Accept", and "Reject". Clicking on "Show in map" redirects users to a Google map visual (refer to Figure 5.4.7d), delineating the route between the donor's location and the charity's current location. Opting for "Accept" prompts a confirmation dialog, and upon agreement, the donation's status transitions to 'Accepted'. Conversely, selecting "Reject" brings forth a dialog, prompting users to specify a rejection rationale (see Figure 5.4.16c). Once a reason is selected and confirmed, the donation's status updates to 'Rejected'.

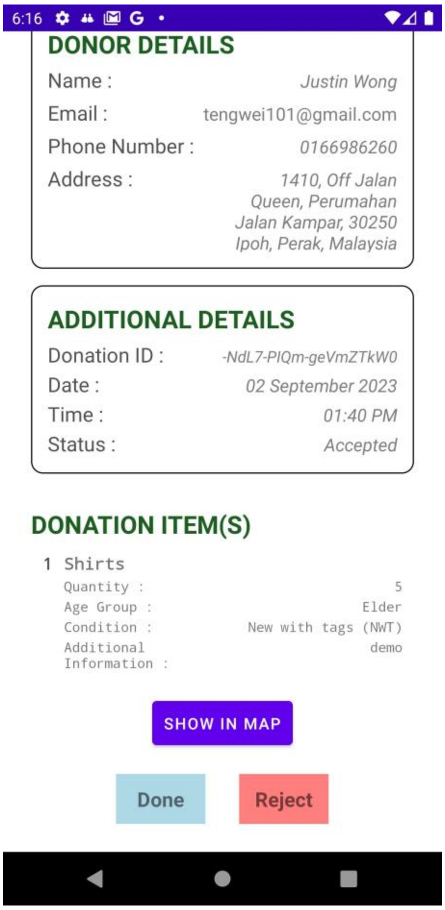


Figure 5.4.16d: Accepted Request

Within the 'Accepted Request' view, the initial "Accept" option is substituted by a "Done" button, while "Show in map" and "Reject" buttons remain accessible. After a successful delivery by the driver, the charity assesses the donated items' condition. If everything is satisfactory, the charity can signify the donation process's culmination by pressing the "Done" button. Consequently, the donor's account receives a specified number of reward points in acknowledgment of their contribution.

5.5 Implementation Issues and Challenges

First of all, leveraging the Firebase Realtime Database in the secondhand clothing and donation system comes with specific challenges. As a NoSQL cloud database, Firebase synchronizes data in real-time across all clients. However, with growing users, this feature can strain bandwidth and increase operational costs. Data modeling in Firebase's JSON-like structure demands strategic nesting and denormalization for efficient data retrieval. Over-nesting can lead to cumbersome data pulls, while under-nesting may result in redundancy. Moreover, ensuring security rules are tight is essential, given the platform's sensitive data on user profiles, transactions, and charity details. A slip in configuration can inadvertently expose crucial information. Furthermore, the ever-expanding dataset in the platform necessitates robust and frequent backup strategies, ensuring data integrity and protection against potential losses or corruptions. Thus, the challenge lies in optimizing Firebase's real-time features while ensuring efficiency, security, and cost-effectiveness.

On the other hand, integration with Google Maps for real-time tracking introduces a blend of technical and user-centric challenges. From a technical standpoint, continuous integration demands that the application remains constantly synchronized with Google's rapidly evolving APIs. This means any updates or changes Google makes can potentially disrupt the service on the application, requiring prompt attention to maintain functionality. There's also the intricacy of handling vast amounts of location data in real-time, ensuring that there are no lags or inaccuracies in the tracking feature. Furthermore, bandwidth consumption and cost implications come into play, as real-time data transmission can be resource-intensive. On the user side, the concern revolves around privacy. Users must trust the application with their location data, emphasizing the importance of stringent data security measures. Additionally, ensuring that location data is pinpoint accurate is crucial, as discrepancies can lead to distrust or logistical challenges for the user. All in all, while the integration promises valuable functionality, it comes with the need for meticulous management and consistent oversight to guarantee its seamless operation.

Besides, navigating logistical challenges for donations presents a nuanced set of obstacles. The mission to ensure that donations are delivered accurately and punctually is no trivial endeavour, especially when considering the multifaceted nature of the process. It begins with the donor's intent, transcends through a digital system to notify the receiving charity, and culminates in a physical exchange, often involving third-party logistics providers. This entire journey demands impeccable synchronization. Third-party logistics, while offering scalability and expertise, introduce another layer of coordination and potential variability. Their operations, schedules, and any unforeseen delays must be seamlessly integrated into the donation system's framework. Moreover, issues such as damaged goods during transport, miscommunication between parties, or even external factors like inclement weather or traffic disruptions can further complicate the process. Ensuring consistent, timely, and accurate deliveries is thus a sophisticated dance of technology, human effort, and on-ground realities, each playing its part to uphold the integrity of the donation process.

Last but not least, addressing security concerns within an online platform, particularly one dealing with second-hand sales and donations, is paramount. The management of personal user data, especially sensitive information like addresses, contact details, and most critically, payment information, necessitates the implementation of rigorous security protocols. Any vulnerability or oversight can potentially expose the system to breaches, leading to significant repercussions both in terms of user trust and potential financial liabilities. Alongside this, integrating a payment gateway amplifies these challenges. Introducing multiple payment methods, from credit cards to e-wallets, demands a robust infrastructure that can not only facilitate seamless transactions but also ensure that every financial exchange is encrypted and secure from end-to-end. Each payment method may come with its own set of security protocols and standards, and ensuring compatibility without compromising on security can be a daunting task. Overall, while these features greatly enhance user experience, they simultaneously demand meticulous attention to detail to maintain the integrity and trustworthiness of the platform.

CHAPTER 6 System Evaluation and Discussion

6.1 Black Box Testing

Table 6.1.1 Test Scenario: Check user account registration functionality

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Successful user registration	1. Launch the mobile application. 2. Navigate to the registration page. 3. Enter a unique email address. 4. Enter a password with a length of at least 6 characters. 5. Click the "Register" button.	1. The new account should be visible in Firebase Authentication. 2. The user's details should be stored in the "Users" collection in the Firebase Real-time database. 3. A success message should be displayed to the user. 5. The user should be redirected to the home page.	As Expected	Pass
Register with an email that's already in use	1. Launch the mobile application. 2. Navigate to the registration page.	1. A message should display: "The email is already in use by another account."	As Expected	Pass

	3. Enter an email address that's already registered with the app. 4. Enter any password. 5. Click the "Register" button.			
Register with a password less than 6 characters	1. Launch the mobile application. 2. Navigate to the registration page. 3. Enter a unique email address. 4. Enter a password with a length of less than 6 characters. 5. Click the "Register" button.	1. A validation message should be displayed, indicating the password is too short.	As Expected	Pass

Table 6.1.2 Test Scenario: Check user account login functionality

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Successful user login	1. Launch the mobile application. 2. Navigate to the login page. 3. Enter a registered email address. 4. Enter the correct password associated with that email. 5. Click the "Login" button.	1. The user should be successfully logged in. 2. The user should be redirected to the home page.	As Expected	Pass
Unsuccessful login due to incorrect password	1. Launch the mobile application. 2. Navigate to the login page. 3. Enter a registered email address. 4. Enter an incorrect password. 5. Click the "Login" button.	1. A message should display: "Incorrect password."	As Expected	Pass
Unsuccessful login due to unregistered email	1. Launch the mobile application. 2. Navigate to the login page.	1. A message should display: "This email is not registered."	As Expected	Pass

	3. Enter an unregistered email address. 4. Enter any password. 5. Click the "Login" button.			
Unsuccessful login due to empty fields	1. Launch the mobile application. 2. Navigate to the login page. 3. Leave email and password fields empty. 4. Click the "Login" button.	1. A validation message should display, indicating that the email and password fields cannot be empty.	As Expected	Pass
Email format validation during login	1. Launch the mobile application. 2. Navigate to the login page. 3. Enter an improperly formatted email address (e.g., "user@domain", "userdomain.com", "user@.com"). 4. Enter any password. 5. Click the "Login" button.	1. A validation message should display, indicating: "Please enter a valid email address."	As Expected	Pass

Table 6.1.3 Test Scenario: Check charity organization account registration functionality

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Successful charity organization registration	1. Navigate to the charity organization registration page. 2. Section 1 (Create a Charity Account): a) Enter a unique email address. b) Enter a password. 3. Section 2 (Organization Information): a) Upload a valid image for the organization. b) Enter the organization's name. c) Enter the organization's website (can be skipped as it's optional). d) Enter the owner's name. e) Enter a valid phone number.	1. A new charity organization account is created successfully. 2. The details are stored correctly in the "Charities" collection. 3. A success message is displayed, followed by redirection to the charity homepage.	As Expected	Pass

	f) Input the address. g) Fill in the city. h) Input the state. i) Enter the appropriate poscode. j) Add a description of the organization. 4. Click the "Register" button.			
Email format validation for charity organization registration	1. Follow the steps to navigate to the charity registration page. 2. In Section 1, input an improperly formatted email address (e.g., "org@charity", "orgcharity.com"). 3. Fill in other fields as necessary. 4. Click the "Register" button.	1. A validation message displays: "Please enter a valid email address."	As Expected	Pass
Missing mandatory fields for charity organization registration	1. Navigate to the charity organization registration page. 2. Leave a mandatory field, like the organization's name, empty.	1. A validation message is displayed for the mandatory field, indicating that it cannot be left empty.	As Expected	Pass

	3. Fill in other fields as necessary. 4. Click the "Register" button.			
Selecting the camera option for the image field	1. Navigate to the charity organization registration page. 2. Click on the image field. 3. Choose the "camera" option from the popup. Observe the camera permission request.	1. A permission request pops up, asking for camera access.	As Expected	Pass
Allowing camera permission after choosing the camera option	1. After choosing the "camera" option (from the above test case), click "Allow" on the camera permission request. 2. Check the camera's functionality within the app.	1. The application's camera functionality is activated, allowing the user to capture an image for the organization.	As Expected	Pass
Denying camera permission after choosing the camera option	1. After choosing the "camera" option (from the above test case), click "Deny" on the camera permission request. 2. Observe the application's response.	1. A message or prompt should inform the user that the camera functionality won't work without the necessary permissions. 2. The user will be directed back	As Expected	Pass

		to the registration form.		
Selecting the gallery option for the image field	1. Navigate to the charity organization registration page. 2. Click on the image field. 3. Choose the "gallery" option from the popup. 4. Observe the storage permission request.	1. A permission request pops up, asking for access to photos, media, and files.	As Expected	Pass
Allowing storage permission after choosing the gallery option	1. After choosing the "gallery" option (from the above test case), click "Allow" on the storage permission request. 2. Check the gallery's functionality within the app	1. The application's gallery or file browser is activated, allowing the user to select an image from their device for the organization.	As Expected	Pass
Denying storage permission after choosing the gallery option	1. After choosing the "gallery" option (from the above test case), click "Deny" on the storage permission request. 2. Observe the application's response.	1. A message or prompt should inform the user that the gallery functionality won't work without the necessary permissions. 2. The user will be directed back	As Expected	Pass

		to the registration form.		

Table 6.1.4 Test Scenario: Check the loading of the charity list based on the user's location.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Check Interaction with Location Pinpoint Logo	1. Click on the "Location Pinpoint" logo.	1. System prompts the user for permission to access the device's location.	As Expected	Pass
Check Behavior when GPS is Turned Off	1. Ensure GPS is turned off. 2. Click on the "Location Pinpoint" logo.	1. The app notifies the user to turn on the GPS.	As Expected	Pass
Check Behavior when GPS Access is Denied	1. Click on the "Location Pinpoint" logo. 2. Deny the permission request to access the device's location.	1. App informs the user that location access is necessary to filter charity lists and prompts the user to provide access.	As Expected	Pass
Check Behavior when GPS Access is Granted	1. Click on the "Location Pinpoint" logo. 2. Grant the permission request to access the device's location.	1. The app successfully fetches the user's latitude and longitude.	As Expected	Pass

Check Filtering of Charities based on Location	1. After granting permission, wait for the charity list to load.	1. Only charities within a 10km radius of the user's location are displayed. 2. Charities outside the 10km radius are not displayed.	As Expected	Pass
Check Display When No Charities are Within the 10km Radius	1. If there are no charities within the 10km radius, view the displayed result after location-based filtering.	1. A message indicates that no charities are found within the 10km radius of the user's location.	As Expected	Pass
Check Behavior on Fetching Location Error	1. Induce an error in fetching the location (e.g., simulate this scenario in a testing environment). 2. Click on the "Location Pinpoint" logo.	1. The app informs the user of the error and suggests retrying or checking their device's location settings.	As Expected	Pass

Table 6.1.5 Test Scenario: Check the search functionality for charity names ensuring results within a 10km radius of the user's location.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Search for a Known Charity Within 10km	1. Type the name of a known charity (which is within 10km radius) into the search field. 2. Submit the search query.	1. The specific charity appears in the search results. 2. No charities outside the 10km radius are displayed.	As Expected	Pass
Search for a Known Charity Outside 10km	1. Type the name of a known charity (which is outside the 10km radius) into the search field. 2. Submit the search query.	1. The charity does not appear in the search results.	As Expected	Pass
Search for an Unknown Charity Name	1. Type an unknown or non-existent charity name into the search field. 2. Submit the search query.	1. A message indicates that no charities matching the search criteria are found within the 10km radius.	As Expected	Pass
Search for a Charity Name Partially	1. Type part of a known charity's name (which is within 10km radius) into the search field. 2. Submit the search query.	1. Charities with names containing the search query and located within the 10km radius are displayed.	As Expected	Pass

Table 6.1.6 Test Scenario: Check the display and functionality of the charity description page when a user selects a charity from the list.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Check Basic Charity Information Display	1. Click on a charity from the charity list.	1. User is directed to the charity description page which accurately displays: • Charity image • Charity name • State • Rating (from 0 to 5.0) • Description	As Expected	Pass
Check Google Map Display	1. Click on a charity from the charity list. 2. Observe the Google map section.	1. Google map displays the location of the charity based on the fetched address. 2. Zooming in and out of the map functions smoothly.	As Expected	Pass
Check Full Address Display	1. Click on a charity from the charity list.	1. The full address of the charity is displayed accurately.	As Expected	Pass
Check Contact Information Display	1. Click on a charity from the charity list.	1. The following contact details of the charity are displayed accurately:	As Expected	Pass

		• Email • Website (if available) • Phone number		
Ensure Google Map Matches Address	1. Click on a charity from the charity list. 2. Compare the address displayed with the location indicated on the Google map.	1. The location indicated on the Google map matches the displayed address of the charity.	As Expected	Pass
Ensure Rating Display is Correct	1. Click on a charity with a known rating.	1. The rating displayed matches the known rating of the charity (from 0 to 5.0).	As Expected	Pass
Check the Behavior for Charities Without a Website	1. Click on a charity that does not have a website listed.	1. The website section indicates that the information is left blank.	As Expected	Pass
Check Google Map Functionality	1. Click on a charity from the charity list. 2. Interact with the Google map (pan, zoom, click on location markers).	1. The map responds correctly to user interactions without glitches.	As Expected	Pass

Table 6.1.7 Test Scenario: Check the functionality of the "DONATE NOW" button on the charity description page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Basic Navigation to Donation Page	1. Click on the "DONATE NOW" button.	User is directed to the donation page.	As Expected	Pass
Check Display of Donation Page	1. Navigate to the donation page as described above.	1. User's details like name, email, phone number, and address are displayed correctly under "Donor Details" section. 2. There is an available section or field for users to insert or specify what items they want to donate.	As Expected	Pass

Table 6.1.8 Test Scenario: Check the functionality of editing donor details.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Check Display of Edit Dialog	1. Click on the "Edit" text or button.	1. A dialog box opens, displaying fields for user to edit their details.	As Expected	Pass
Edit Donor Details Functionality	1. Modify values in the opened dialog box. 2. Confirm and save the changes.	1. The donor details on the donation page update to reflect the changes made.	As Expected	Pass
Check 'Get Current Location' Button in Dialog	1. Click on "Get Current Location" button in the dialog box.	1. A request for location permission pops up if not already granted. 2. If granted, the address field is automatically set to the current location's address.	As Expected	Pass
Check Address Update After Getting Current Location	1. After granting location permission and fetching the address, save the dialog changes.	1. The donor's address on the donation page updates to the current location's address.	As Expected	Pass

Table 6.1.9 Test Scenario: Check the donation item addition, deletion and modification

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Add Donation Item Dialog Display	1. Click on the "Add Item+" button.	1. A dialog pops up with fields: category, quantity, age of group, condition, and additional information (optional).	As Expected	Pass
Validate Mandatory Fields Empty State	1. In the dialog, keep all mandatory fields empty and click "Save".	1. A warning message displays, prompting the user to fill out all mandatory fields.	As Expected	Pass
Add Single Donation Item	1. Fill in all the required details in the dialog and click "Save".	1. The item gets listed under the "Donation Item(s)" section with the provided details.	As Expected	Pass
Add Multiple Donation Items	1. Repeat the above step multiple times with different details.	1. Multiple items get listed under the "Donation Item(s)" section, each with the respective details provided.	As Expected	Pass
Edit Donation Item Details	1. Click on an added item under "Donation Item(s)" section to edit it.	1. The item under "Donation Item(s)" updates to reflect the changes made.	As Expected	Pass

	2. Make changes in the dialog that appears and click "Save".			
Validate Editing Functionality with Multiple Items	1. Add multiple items. 2. Edit one of the items in the middle of the list.	1. Only the selected item's details get modified, while others remain unchanged.	As Expected	Pass
Check Optional Field Functionality for "Additional Information"	1. Add a donation item without filling the optional "Additional Information" field.	1. The item gets added without any information in the respective section, showing no errors.	As Expected	Pass
Edit Optional Field	1. Click to edit the item added above. 2. Fill in the "Additional Information" and save.	1. The "Additional Information" for the item updates with the provided information.	As Expected	Pass
Single Item Deletion	1. Fill in donor details. 2. Add multiple donation items. 3. Delete one donation item. 4. Observe the donation items list.	1. The specified item is deleted from the list, and the remaining items are still present.	As Expected	Pass
All Items Deletion	1. Fill in donor details. 2. Add multiple donation items.	1. The donation items list is empty after all deletions.	As Expected	Pass

	3. Delete all donation items one by one. 4. Observe the donation items list.			
Deletion With Quantity Check	1. Fill in donor details. 2. Add donation items such that their total quantity is 5. 3. Delete one item. 4. Click the "Donate" button.	1. An error message should appear indicating that the total quantity of all donation items must be a minimum of 5.	As Expected	Pass

Table 6.1.10 Test Scenario: Validate and Submit Donor Details and Donation Items to Database

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Donor Details Empty Check	1. With the donor details section empty, try clicking the "Donate" button.	1. An error message should pop up indicating that donor details are mandatory.	As Expected	Pass
Donation Items List Empty Check	1. Fill in the donor details, leave the donation items list empty 2. Click the "Donate" button.	1. An error message should pop up indicating that at least one donation item is required.	As Expected	Pass
Donation Items	1. Fill in the donor details	1. An error message should appear indicating	As Expected	Pass

Quantity Check	2. Add 4 donation items each with a quantity of 1 3. Click the "Donate" button.	that the total quantity of all donation items must be a minimum of 5.		
Successful Donation Submission	1. Ensure donor details are filled 2. Add multiple donation items such that their total quantity is at least 5, 3. Click the "Donate" button.	1. A success message should appear confirming the donation, and all donor details and donation item list should be stored in the database.	As Expected	Pass
Database Verification	1. After the successful submission in the previous step, check the database.	1. All the donor details and donation items must be stored correctly in the database, matching the details provided.	As Expected	Pass
Quantity Over 5 Verification	1. Fill in donor details 2. Add 2 donation items with quantities 3 and 4 respectively (making the total 7), 3. Click the "Donate" button.	1. A success message should appear confirming the donation, and all details should be stored correctly in the database.	As Expected	Pass
Multiple Items with Different Details	1. Fill in the donor details. 2. Add multiple donation items with	1. A success message should appear, and every individual donation	As Expected	Pass

	different details such that their total quantity is at least 5, 3. Click the "Donate" button.	item with its specific details should be stored in the database.		
Donation Data Integrity with Charity and User	1. Ensure you're logged in as a user. 2. Select a charity. 3. Fill in donor details. 4. Add donation items (ensure total quantity is >=5). 5. Click the "Donate" button. 6. Check the database for the submitted donation record.	1. The donation record in the database should not only have the donor details and donation items but also the 'charity_id' and 'user_id' of the current user associated with the donation.	As Expected	Pass
Check reward points calculation after donation.	1. Click on the "Donate" button after filling in all required details. 2. Calculate the expected reward points based on the total quantity using the calculateRewardPoints function.	1. Based on the total quantity of donated items, the reward points are calculated as per the provided function: • 5-9: Reward points = total x 10 • 10-14: Reward points = total x 12 • 15-19: Reward	As Expected	Pass

		points = total x 14 • 20-24: Reward points = total x 16 • 25-29: Reward points = total x 18 • 30+: Reward points = total x 20 • Less than 5: No reward points awarded. 2. The calculated reward points are stored in the database, updating the user's current reward points.		

Table 6.1.11 Test Scenario: Verify notification functionality for charities upon receiving a new donation request.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Check the presence of notification for the charity.	1. Charity is logged into their account. 2. A user submits a donation request for this particular charity. 3. Observe the top-left corner of the "Donation Request" button.	1. A red alert circle logo appears at the top-left corner of the "Donation Request" button indicating a new donation request.	As Expected	Pass
Check the absence of notification upon viewing the request.	1. Click on the "Donation Request" button. 2. Review the new donation request. 3. Go back to the main screen or dashboard.	1. The red alert circle logo on the "Donation Request" button disappears after the charity has viewed the new request.	As Expected	Pass
Verify multiple notifications.	1. Multiple users submit donation requests for this particular charity. 2. Observe the top-left corner of the "Donation Request" button.	1. The red alert circle logo appears at the top-left corner of the "Donation Request" button,	As Expected	Pass
Check mobile notification.	1. Charity's mobile application is	1. A mobile notification appears,	As Expected	Pass

	running in the background or is closed. 2. A user submits a donation request for this particular charity. 3. Observe the charity's phone notification bar or screen.	indicating a new donation request for the charity.		

Table 6.1.12 Test Scenario: Verify the categorization and listing of Donation Requests based on their status.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Check automatic redirection to the Pending section.	1. Navigate to the Donation Requests page.	1. The system automatically directs the charity to the "Pending" section, displaying all pending donation requests.	As Expected	Pass
Verify the listing of donation requests in the Accepted section.	1. Navigate to the Donation Requests page. 2. Manually select the "Accept" section/tab.	1. All donation requests that have been accepted by the charity are listed under the "Accept" section.	As Expected	Pass
Verify the listing of donation	1. Navigate to the Donation Requests page.	1. All donation requests that have been rejected by the	As Expected	Pass

requests in the Rejected section.	2. Manually select the "Rejected" section/tab.	charity are listed under the "Rejected" section.		
Verify the listing of completed donation requests in the Done section.	1. Navigate to the Donation Requests page. 2. Manually select the "Done" section/tab.	All donation requests that have been marked as completed by the charity are listed under the "Done" section.	As Expected	Pass
Verify the listing of all donation requests in the All section.	1. Navigate to the Donation Requests page. 2. Manually select the "All" section/tab.	1. Donation requests of all statuses (Pending, Accept, Rejected, and Done) are listed under the "All" section.	As Expected	Pass

Table 6.1.13 Test Scenario: Verify the information displayed in Donation Details page for charities.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify display of Donor Details.	1. Navigate to the Donation Requests page. 2. Click on a donation request.	1. The Donation Details page opens. 2. The Donor Details section correctly displays the name, email, phone number, and address of the donor.	As Expected	Pass
Verify display of Additional Details.	1. Navigate to the Donation Requests page.	1. The Additional Details section correctly displays		

	2. Click on a donation request.	the Donation ID, Date, Time, and Status of the donation request.		
Verify display of Donation Item(s).	1. Navigate to the Donation Requests page. 2. Click on a donation request.	1. The Donation Item(s) section correctly lists all the items included in the donation request.		

Table 6.1.14 Test Scenario: Verify the functionality and UI elements of the "Show in Map" feature for charities.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify display of the map with directions.	1. Navigate to the Donation Requests page. 2. Click on a specific donation request. 3. Click on the "Show in map" button.	1. A map is displayed showing the direction from the charity's location to the donor's location. Both points (charity and donor) are distinctly marked.	As Expected	Pass
Verify display of Estimated Time of Arrival (ETA).	1. Navigate to the Donation Requests page. 2. Click on a specific donation request. 3. Click on the "Show in map" button.	1. Below the map, the Estimated Time of Arrival (ETA) from the charity's location to the donor's location is clearly displayed.	As Expected	Pass

Verify functionality of the phone call button.	1. Navigate to the Donation Requests page. 2. Click on a specific donation request. 3. Click on the "Show in map" button. 4. Click on the phone call button.	1. The system attempts to initiate a call to the donor using the provided phone number.	As Expected	Pass
Check responsiveness and accuracy of the map.	1. Navigate to the Donation Requests page. 2. Click on a specific donation request. 3. Click on the "Show in map" button. 4. Zoom in, zoom out, and drag to navigate the map.	1. The map responds smoothly to the user's interactions and accurately displays directions and locations.	As Expected	Pass
Check if the GPS is enabled when accessing the "Show in Map" feature.	1. Navigate to the Donation Requests page. 2. Click on a specific donation request. 3. Click on the "Show in map" button.	1. The system prompts the user to enable GPS to access the map's full features.	As Expected	Pass

Check if location permissions are requested when accessing the "Show in Map" feature.	1. Navigate to the Donation Requests page. 2. Click on a specific donation request. 3. Click on the "Show in map" button.	1. The system requests location permissions before showing directions on the map.	As Expected	Pass
Verify map's behavior when location permission is denied.	1. Navigate to the Donation Requests page. 2. Click on a specific donation request. 3. Click on the "Show in map" button. 4. When prompted for location permissions, deny the request.	1. A message will be displayed informing the user that location permissions are necessary to access the map's full features.	As Expected	Pass

Table 6.1.15 Test Scenario: Validate the "Accept" action functionality for donation requests.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the status update in the database after the "Accept" action.	1. Navigate to the Donation Requests page. 2. Click on a specific "Pending" donation request. 3. Click on the "Accept" button. 4. Check the status of that donation request in the database.	1. The status of the donation request in the database should be changed to "Accepted".	As Expected	Pass
Verify the status update in the Donation Request Description page after the "Accept" action.	1. Navigate to the Donation Requests page. 2. Click on a specific "Pending" donation request. 3. Click on the "Accept" button. 4. Observe the status on the Donation Request Description page.	1. The status displayed on the Donation Request Description page should be "Accepted".	As Expected	Pass

Table 6.1.16 Test Scenario: Validate the tracking feature for the donor when a donation request is "Accepted".

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the display of the DeliveryFragment for donors when donation status is "Accepted".	1. Navigate to the StatusDashboardActivity. 2. Observe the displayed fragment.	1. The DeliveryFragment is displayed, showing the map.	As Expected	Pass
Verify real-time tracking of the delivery driver's location on the map.	1. Observe the initial location of the delivery driver on the map. 2. Wait for 1 minute. 3. Observe the updated location of the delivery driver on the map.	1. The location of the delivery driver is updated on the map after every 1 minute interval, reflecting their real-time movement.	As Expected	Pass
Verify the real-time update of ETA for the donation delivery.	1. Observe the initial ETA displayed on the DeliveryFragment. 2. Wait for the location of the delivery driver to be updated (typically after 1 minute). 3. Observe the updated ETA on the DeliveryFragment.	1. As the delivery driver moves closer to the donor's location, the ETA displayed on the DeliveryFragment is updated to reflect the reduced time.	As Expected	Pass

Table 6.1.17 Test Scenario: Validate the rejection process for a donation request.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the functionality of the "Reject" option for donation requests.	1. Click on the "Reject" button. 2. Observe a dialog that prompts the user to choose the reason for rejection. 3. Choose a reason from the provided options. 4. Click on the "Yes" button to confirm the rejection. 5. Check the status of the donation request in the Donation Request Description page. 6. Check the database for the updated status and rejection reason for the specific donation request.	1. Upon clicking "Reject", a dialog appears offering reasons for rejection. 2. Upon choosing a reason and clicking "Yes", the status of the donation request on the Donation Request Description page changes to "Rejected". 3. The database reflects the updated status of "Rejected" and stores the selected rejection reason for the donation request.	As Expected	Pass

Table 6.1.18 Test Scenario: Validate the notification and display of rejection information for the donor.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the donor receives a notification and can view the reason for the donation request rejection.	1. Check if there's a notification/alert for the donor indicating that their donation request has been rejected. 2. Navigate to the StatusDashboardActivity. 3. Observe if the RejectedFragment is displayed by default. 4. Within the RejectedFragment, check for the displayed reason of rejection. 5. Observe if the charity's avatar is visible.	1. A notification/alert is sent to the donor about the rejection of their donation request. 2. On opening the StatusDashboardActivity, the RejectedFragment is the default view. 3. The exact reason provided by the charity for the rejection is clearly displayed. 4. The charity's avatar is visible next to the reason.	As Expected	Pass

Table 6.1.19 Test Scenario: Validate the update of donation request status to "Done" by the charity and its reflection on the Donation Request Description page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the functionality of the "Done" button.	1. Navigate to the Donation Request Description page for the chosen donation request. 2. Click on the "Done" button. 3. Observe the status of the donation request on the Donation Request Description page. 4. Check the status of the donation request in the database.	1. The status displayed on the Donation Request Description page updates to "Done". 2. The status of the donation request in the database is changed to "Done".	As Expected	Pass
Verify Reward Points Addition After Donation Status Change	1. Access the database and verify the status of the donation request. 2. In the database, check the reward points assigned for the donation based on the total quantity.	1. The donor's reward points in the database are incremented by the appropriate amount based on the donation's total quantity.	As Expected	Pass

	3. Access the donor's profile and verify the addition of the reward points to their total.			
Verify that other donation status options are not available once marked as "Done".	1. A donation request has been marked as "Done". 2. Navigate to the Donation Request Description page for that donation. 3. Check for the availability of other status buttons like "Accept", "Reject", etc.	1. Other status buttons are not visible, ensuring that the status cannot be changed from "Done" back to any other state.	As Expected	Pass

Table 6.1.20 Test Scenario: Validate the display and contents of the DoneFragment in the StatusDashboardActivity once the donation request is marked as "Done."

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the display of DoneFragment after the donation request is marked as "Done."	1. As a donor, navigate to the StatusDashboardActivity. 2. Observe the currently displayed fragment.	1. The DoneFragment is displayed as the active fragment on the StatusDashboardActivity.	As Expected	Pass

Verify the content of the DoneFragment.	1. Check the presence of a thank you text/message. 2. Observe the charity avatar. 3. Look for a system message indicating the successful delivery of the donation.	1. A thank you message/text is displayed prominently. 2. The charity avatar is clearly visible. 3. A system message confirms the successful delivery of the donation.	As Expected	Pass

Table 6.1.21 Test Scenario: Validate the display and loading of products in the Marketplace page based on their "available" status.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the loading of products with the "available" status on the Marketplace page.	1. As a user, navigate to the Marketplace page. 2. Observe the products displayed in the list or grid view.	1. Only products with the status "available" are displayed on the Marketplace page.	As Expected	Pass
Check for products with status other than "available" in the Marketplace.	1. Navigate to the Marketplace page. 2. Browse through all the products displayed. 3. Make a note of any known products with a non-"available" status.	1. No products with a status other than "available" are displayed in the Marketplace.	As Expected	Pass

Validate the behavior when no products have the "available" status.	1. Navigate to the Marketplace page. 2. Observe the content of the page.	1. A message indicating that there are currently no available products should be displayed.	As Expected	Pass
Ensure product details are accurate when displayed.	1. Choose a product with the "available" status from the database (note its details). 2. Navigate to the Marketplace page. 3. Find the chosen product and verify its displayed details.	1. The details of the product displayed in the Marketplace match with the details in the database.	As Expected	Pass

Table 6.1.22 Test Scenario: Validate the search functionality and product category filter on the Marketplace page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Verify the search functionality using product name.	1. Navigate to the Marketplace page. 2. Locate and use the search bar to input a specific product name. 3. Observe the results displayed below or on the page.	1. Only products with names matching or closely related to the inputted search term should be displayed.	As Expected	Pass

Check the dropdown list for available product categories.	1. Navigate to the Marketplace page. 2. Click on the product category filter dropdown. 3. Observe the list of categories available.	1. Categories like Shirts, Pants, Dresses, Shoes, etc., are available for selection.	As Expected	Pass
Verify the product filtering based on a specific category.	1. Navigate to the Marketplace page. 2. Click on the product category filter dropdown. 3. Select the "Shirts" category. 4. Observe the products displayed on the page.	1. Only products categorized under "Shirts" should be displayed.	As Expected	Pass
Validate search functionality in combination with category filtering.	1. Navigate to the Marketplace page. 2. Use the category filter dropdown and select "Shoes". 3. Use the search bar to input the term "Sport". 4. Observe the results displayed.	1. Only products categorized under "Shoes" with names containing "Sport" should be displayed.	As Expected	Pass
Ensure product search returns results irrespective of letter case.	1. Navigate to the Marketplace page. 2. Use the search bar to input the term "summer dress" (in lowercase).	1. Products with the name "Summer Dress" are displayed, indicating case-insensitive search.	As Expected	Pass

	3. Observe the results displayed.			

Table 6.1.23 Test Scenario: Validate the "Sell" functionality on the Marketplace page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Validate navigation to the "Sell Product Form" when clicking on the "Sell" button.	1. Click on the "Sell" button. 2. Observe the page or form displayed next.	1. The "Sell Product Form" is displayed with fields for product image, product title, category, price (RM), size, condition, and description.	As Expected	Pass
Verify permission requests when trying to insert a product image.	1. Click on the field/button to insert a product image. 2. Observe any prompt or permission request.	1. System prompts the user to grant storage permissions to access and upload images.	As Expected	Pass
Ensure all required fields need to be filled before publishing.	1. Fill in some fields, deliberately leaving one or more required fields empty. 2. Attempt to click on the "Publish" text/button.	1. An alert or notification is shown, instructing the user to fill in all required fields.	As Expected	Pass

	3. Observe any notifications or alerts.			
Validate storing the product details in the database after successful submission.	1. Fill in all required fields. 2. Click on the "Publish" text/button. 3. Access the backend database. 4. Search for the recently added product details.	1. The product details are successfully stored in the database with all the provided information.	As Expected	Pass
Validate product submission and availability on Marketplace.	1. Fill in all required fields. 2. Click on the "Publish" text/button. 3. Navigate back to the Marketplace page. 4. Search or look for the product added.	1. The product is listed on the Marketplace page with the status "available".	As Expected	Pass
Validate optional field "description".	1. Fill in all required fields, leaving the description field empty. 2. Click on the "Publish" text/button. 3. Navigate back to the Marketplace page.	1. The product is listed on the Marketplace page without any description.	As Expected	Pass

	4. View the product details of the recently added product.			
Validate the visibility of a product with status "available".	1. Navigate to the Marketplace page. 2. Search or look for the product with status "unavailable".	1. The product with status "unavailable" is not listed on the Marketplace page.	As Expected	Pass

Table 6.1.24 Test Scenario: Navigate to Product Description Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Validate the display of Product Description after clicking on a product in the product list.	1. Identify a product from the product list. 2. Click on the chosen product.	1. User is directed to the Product Description page corresponding to the clicked product.	As Expected	Pass
Check the display of all necessary product details on the Product Description page.	1. Observe the Product Description page.	The following details are displayed and match the selected product's details: • Product Image • Product Name • Description • Price	As Expected	Pass

		• Category • Size • Condition		
Check the display of the seller's details on the Product Description page.	1. Scroll to the seller details section. 2. Observe the seller's details section.	The following seller details are displayed: • Seller Name • Seller Email • Phone Number	As Expected	Pass

Table 6.1.25 Test Scenario: Interaction with WhatsApp from Product Description Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Validate the visibility of the WhatsApp logo next to seller details.	1. Observe the area next to the seller details.	1. A WhatsApp logo is clearly visible next to the seller details.	As Expected	Pass
Check the redirection to WhatsApp application after clicking the WhatsApp logo.	1. Click on the WhatsApp logo.	1. User is directed to the WhatsApp application. 2. It shows the messenger interface of the seller.	As Expected	Pass
Validate the pre-generated message in the WhatsApp message box.	1. Observe the message box in WhatsApp.	1. A pre-generated message by the system is visible in the message box. The message	As Expected	Pass

		contains the following details: • Product Title • Price • Category • Size • Seller Name		
Check the ability to send the pre-generated message to the seller.	1. Click on the send icon in WhatsApp to send the message.	1. The pre-generated message is sent to the seller without any issues.	As Expected	Pass
Check behavior when attempting to redirect to WhatsApp with an invalid or null seller phone number.	1. Ensure the seller phone number is either set to null or is an invalid format. 2. Click on the WhatsApp logo.	1. The app does not crash or freeze. 2. A suitable error message is displayed to the user, informing them of the issue with the phone number (e.g., "Invalid phone number" or "Phone number not available").	As Expected	Pass

Table 6.1.26 Test Scenario: Validate the behavior of the "Add to Wishlist" functionality and its interaction with product availability.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Adding a Product to Wishlist	1. Click on the "Add to Wishlist" button. 2. Navigate to the user's wishlist.	1. The product appears in the user's wishlist. 2. The UserFavorite collection in the database contains the product as an entry associated with the user's ID.	As Expected	Pass
Product's Status Changes to "unavailable" or "sold"	1. The status of the product (possibly from a seller's action or another buyer's purchase) changes to "unavailable" or "sold". 2. Navigate to the user's wishlist.	1. The product no longer appears in the user's wishlist, having been automatically removed due to its status change. 2. The UserFavorite collection in the database does not contain the product as an entry associated with the user's ID (indicating it was automatically removed due to its status change).	As Expected	Pass

Table 6.1.27 Test Scenario: Validate the behavior and display of the PaymentActivity when a user chooses to purchase a product.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Redirect to PaymentActivity on "Purchase Now" Click	1. Click on the "Purchase Now" button.	1. User is directed to the 'PaymentActivity'.	As Expected	Pass
Verification of Recipient Details in PaymentActivity	1. Check the recipient details section.	1. Recipient details (name, phone number, and full address) are correctly displayed and match the user's saved details.	As Expected	Pass
Verification of Product Details in PaymentActivity	1. Check the product details section.	1. The product details (seller name, product image, product name, category, price) are correctly displayed and match the selected product's details.	As Expected	Pass
Verification of Delivery Method Details in PaymentActivity	1. Check the delivery method section.	1. The delivery method, its estimated arrival time, and delivery fee are displayed correctly.	As Expected	Pass

Verification of Payment Method in PaymentActivity	1. Check the payment method section.	1. The section displays "Credit / Debit card" as the chosen payment method.	As Expected	Pass
Verification of Payment Details in PaymentActivity	1. Check the payment details section. 2. Compute the total payment manually (subtotal + shipping fee).	1. The payment details section correctly displays the subtotal, Shipping Fee, and the total payment. 2. The total payment displayed matches the manually computed value.	As Expected	Pass
Modify Recipient Details in PaymentActivity	1. Click on the recipient details section to edit. 2. Modify the name, phone number, or address. 3. Confirm and save the changes.	1. Modified details are reflected correctly in the recipient details section.	As Expected	Pass
Check Error Handling with Incomplete or Incorrect Card Details	1. Enter incomplete or incorrect card details. 2. Attempt to proceed with the payment.	1. An error message is displayed, indicating the issue with the card details. Payment does not proceed until valid card	As Expected	Pass

		details are provided.		
Complete a Successful Payment	1. Confirm and submit the payment.	1. Payment is successfully processed. 2. Order Details is successfully stored in “Orders” collection in database. 3. User receives a confirmation notification or is redirected to a success page.	As Expected	Pass
Validate Database Update on Successful Payment	1. Check the database for the record of the transaction.	1. The database correctly reflects the transaction with all the details (product, amount, delivery method, etc.) and marks the product as "sold" to the product status.	As Expected	Pass

Table 6.1.28 Test Scenario: Verification of User Profile Information Display

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Check Display of User Information on Profile Page	1. Observe the displayed username. 2. Observe the displayed phone number. 3. Observe the displayed email. 4. Observe the displayed reward points.	1. The displayed username matches the user's registered username. 2. The displayed phone number matches the user's registered phone number. 3. The displayed email matches the user's registered email. 4. The displayed reward points match the user's accumulated reward points.	As Expected	Pass
Check Profile Page Display for New Users	1. Observe the displayed reward points.	1. The displayed reward points show "0 points".	As Expected	Pass

Table 6.1.29 Test Scenario: Verification of User Profile Information Display

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Check Display of User Information on Profile Page	1. Observe the displayed username. 2. Observe the displayed phone number. 3. Observe the displayed email. 4. Observe the displayed reward points.	1. The displayed username matches the user's registered username. 2. The displayed phone number matches the user's registered phone number. 3. The displayed email matches the user's registered email. 4. The displayed reward points match the user's accumulated reward points.	As Expected	Pass

Table 6.1.30 Test Scenario: Edit Profile Picture in Profile Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Edit Profile Picture Option	1. Navigate to the Profile page. 2. Click on the 'Edit Profile' button. 3. In the dialog, select the 'Edit Profile Picture' option. 4. Observe the options given for the picture source.	1. A dialog pops up giving the user options to select from the camera or gallery.	As Expected	Pass
Upload Picture from Camera	1. From the previous dialog, select 'Camera'. 2. Capture a picture. 3. Confirm the selected picture. 4. Check the updated picture on the profile page and verify it in the database.	1. The profile picture gets updated on the profile page and in the database.		
Upload Picture from Gallery	1. From the previous dialog, select 'Gallery'. 2. Choose a picture.	1. The profile picture gets updated on the profile page and in the database.		

	3. Confirm the selected picture. 4. Check the updated picture on the profile page and verify it in the database.			

Table 6.1.31 Test Scenario: Edit Name in Profile Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Edit Name	1. Navigate to the Profile page. 2. Click on the 'Edit Profile' button. 3. Select 'Edit Name'. 4. A dialog pops up. Leave the name field empty and click 'Save'.	1. A warning message is shown indicating that the name field shouldn't be empty.		
Update Name	1. In the 'Edit Name' dialog, input a new name. 2. Click 'Save'. 3. Check the updated name on the profile page and verify it in the database.	1. The name gets updated on the profile page and in the database.		

Table 6.1.32 Test Scenario: Edit Phone Number in Profile Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Edit Phone	1. Navigate to the Profile page. 2. Click on the 'Edit Profile' button. 3. Select 'Edit Phone'. 4. A dialog pops up. Leave the phone field empty and click 'Save'.	A warning message is shown indicating that the phone field shouldn't be empty.		
Update Phone	1. In the 'Edit Phone' dialog, input a new phone number. 2. Click 'Save'. 3. Check the updated phone number on the profile page and verify it in the database.	1. The phone number gets updated on the profile page and in the database.		

Table 6.1.33 Test Scenario: Change Password in Profile Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Change Password - Correct Current Password	1. Select 'Change Password'. 2. Input the correct current password and a new password. 3. Click 'Save'. 4. Verify if the password has been updated in the database. 5. Logout and try to login using the new password.	1. The password gets updated in the database. 2. User is able to login using the new password.	As Expected	Pass
Change Password - Incorrect Current Password	1. Select 'Change Password'. 2. Input an incorrect current password and a new password. 3. Click 'Save'.	1. A warning message is shown indicating that the current password is incorrect. 2. The password remains unchanged in the database.	As Expected	Pass
Change Password - New Password Criteria	1. Select 'Change Password'. 2. Input the correct current password and a new password that doesn't meet the	1. A warning message is shown indicating the specific criteria the new password does not meet.	As Expected	Pass

	password criteria (e.g., too short, missing special character). 3. Click 'Save'.	2. The password remains unchanged in the database.		
Change Password - Same Current and New Password	1. Select 'Change Password'. 2. Input the correct current password in both the current and new password fields. 3. Click 'Save'.	1. A warning message is shown indicating that the new password should be different from the current password. 2. The password remains unchanged in the database.	As Expected	Pass

Table 6.1.34 Test Scenario: Reward Display based on Status in the Reward Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Display Active Rewards	1. Navigate to the Reward page. 2. Select the 'Active' section/tab. 3. Observe the list of displayed rewards.	1. Only rewards with valid expiration dates beyond the current date and with a status other than "Redeemed" for the logged-in user are displayed.	As Expected	Pass
Display Redeemed Rewards	1. Navigate to the Reward page.	1. Only rewards that the logged-in user has redeemed (status		

	2. Select the 'Redeemed' section/tab. 3. Observe the list of displayed rewards.	"Redeemed") are displayed.		
Display Past Rewards	1. Navigate to the Reward page. 2. Select the 'Past' section/tab. 3. Observe the list of displayed rewards.	1. Rewards that have an expiration date prior to the current date are displayed, irrespective of whether they were redeemed by the user or not.		

Table 6.1.35 Test Scenario: Reward Description Page Navigation and Functionality

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Navigate to Reward Description Page	1. Navigate to the Reward page. 2. Click on any listed reward. 3. Observe the new page or view.	1. The system directs the user to the Reward Description Page specific to the clicked reward.	As Expected	Pass
Verify Reward Details Display	1. From the Reward page, click on a specific reward. 2. On the Reward Description Page,	1. The Reward Description Page accurately displays: • Reward title • Sponsor logo		

	observe the displayed details.	• Sponsor name • Reward description • Rules of the reward		

Table 6.1.36 Test Scenario: Reward Redemption Functionality

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Insufficient Points Scenario	1. Navigate to the Reward Description Page of a reward that costs more points than the user currently has. 2. Try to click the "Redeem" button or observe its state.	1. A message informs user they have insufficient points.	As Expected	Pass
Reward Already Redeemed	1. Ensure the reward's status is set to "Redeemed" for the user. 2. Attempt to click the "Redeem" button or observe its state.	1. A message informs the user that the reward has already been redeemed.	As Expected	Pass
Reward is Expired	1. Ensure the reward's expiration date is	1. A message informs the user that the reward is	As Expected	Pass

	past the current date. 2. Attempt to click the "Redeem" button or observe its state.	expired and cannot be redeemed.		
Redemption Confirmation	1. Click the "Redeem" button for a reward that has not been redeemed and is not expired. 2. Observe the confirmation dialog that appears. 3. Click "Yes" on the confirmation dialog.	1. After clicking "Yes," the "Redeem" button disappears, and a QR code appears on the page.	As Expected	Pass
QR Code Display and Data Verification	1. After successful redemption (from the previous test case), observe the displayed QR code. 2. Scan the QR code with a suitable scanner or tool to verify its data.	1. The QR code contains accurate data, including the user_id, reward_id, and reward status.	As Expected	Pass

QR Code Scanning and Status Update	1. Scan the QR code with the appropriate system scanner or tool. 2. Observe the result on the Reward Description Page.	1. After scanning, the QR code disappears, and a "Redeemed" text appears on the page, indicating that the reward has been successfully redeemed. 2. The reward's status in the database has been changed to "Redeemed".	As Expected	Pass
Subsequent Visit to the Redeemed Reward	1. Navigate away from the Reward Description Page. 2. Navigate back to the same Reward Description Page after redeeming the reward.	1. The page displays the "Redeemed" text, and there is no QR code or "Redeem" button.	As Expected	Pass

Table 6.1.37 Test Scenario: Admin's Functionality to Add a New Reward

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Visibility of the "Add Reward" Button for Admin	1. Navigate to the Reward page. 2. Observe the page elements.	1. The "Add Reward" button is visible to the admin.	As Expected	Pass
Navigation to Add Reward Form Page	1. Click on the "Add Reward" button from the Reward page. 2. Observe the subsequent page or popup.	1. The system navigates the admin to the "Add Reward Form" page.	As Expected	Pass
Presence of Required Fields in Add Reward Form	1. Navigate to the Add Reward Form page. 2. Observe the available fields.	1. The form should have the following fields: Reward Title, Sponsor (Dropdown), Expiration Date, Cost in Reward Points, and Description.	As Expected	Pass
Expiration Date Field Interaction	1. Click on the Expiration Date field. 2. Observe the interaction.	1. A calendar interface pops up, allowing the admin to select a date.	As Expected	Pass
Sponsor Dropdown Values Source	1. Click on the Sponsor dropdown.	1. The values in the dropdown should correspond with the sponsors listed in	As Expected	Pass

	2. Observe the listed sponsors.	the Sponsor collection in the database.		
Add Sponsor Interaction	1. Click on the "Add Sponsor" text/link below the Sponsor dropdown. 2. Observe the popup/dialog.	1. An "Add Sponsor" dialog appears with fields for Sponsor Image, Sponsor Name, Phone Number, and Email.	As Expected	Pass
Add New Sponsor with Valid Data	1. From the Add Sponsor dialog, fill in all the required fields. 2. Click on the "Save" button.	1. A success message is displayed. 2. The newly added sponsor details are stored in the database. 3. The newly added sponsor immediately appears as an option in the Sponsor dropdown list on the Add Reward form.	As Expected	Pass
Error Handling - Missing Fields in Add Sponsor Dialog	1. Open the Add Sponsor dialog. 2. Leave one or more required fields empty. 3. Attempt to save.	1. An error message appears for the missing required fields, prompting the admin to complete them.	As Expected	Pass

Error Handling - Duplicate Sponsor	1. Open the Add Sponsor dialog. 2. Fill in the Sponsor Name field with a name that already exists in the system. 3. Attempt to save.	1. An error message is displayed, informing the admin that the sponsor name already exists in the database.	As Expected	Pass
Adding a New Reward with Valid Data	1. Navigate to the "Add Reward Form" page. 2. Fill in all required fields with valid data. 3. Click on the submit or "Add" button.	1. A success message is displayed, confirming that the reward has been added. 2. The new reward should be visible on the Reward page for users/admins.	As Expected	Pass
Error Handling - Missing Required Fields	1. Navigate to the "Add Reward Form" page. 2. Leave one or more required fields empty. 3. Attempt to submit the form.	1. An error message is displayed for the missing required fields, prompting the admin to fill them in.	As Expected	Pass

Table 6.1.38 Test Scenario: Check Past Donations and Rate Them

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Accessing Past Donation Records	1. Click on the Donation logo from the Profile Page. 2. Observe the page transition.	1. User is directed to the Past Donation Records Page.	As Expected	Pass
Displaying Past Donation Records	1. Navigate to the Past Donation Records Page. 2. Observe the displayed records.	1. All past donation records corresponding to the current user id are loaded and displayed.	As Expected	Pass
Interaction with Donation Rating Stars	1. Locate a donation record. 2. Tap on the stars. 3. Select 3 stars, for instance.	1. The first 3 stars are highlighted upon selection.	As Expected	Pass
Storing Donation Ratings in Database	1. Rate a donation with a certain number of stars. 2. Confirm the rating. 3. Access the database to check the stored value.	1. The selected rating is stored in the database corresponding to that particular donation record.	As Expected	Pass
Calculation Based on Ratings	1. Rate multiple donations for a single charity.	1. The overall rating of the charity is an average based on all	As Expected	Pass

	2. Check the overall rating of the charity.	the ratings given to donations associated with that charity.		
Retaining Donation Ratings on Page Revisit	1. Rate a donation with a certain number of stars. 2. Navigate away from the Past Donation Records Page. 3. Return to the Past Donation Records Page and locate the previously rated donation.	1. The donation retains the previously selected star rating, highlighted accurately.	As Expected	Pass
Error Handling - Duplicate Ratings for Same Donation	1. Rate a donation. 2. Try to rate the same donation again.	1. The rating is updated to the new selection	As Expected	Pass

Table 6.1.39 Test Scenario: Validate Functionality of Tools in the Preloved Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Click on 'Products' Logo	1. Navigate to the Preloved Page. 2. Click on the 'Products' logo.	1. User should be directed to the Product Management Page.	As Expected	Pass
Click on 'Add Product' Logo	1. Navigate to the Preloved Page. 2. Click on the 'Add Product' logo.	1. User should be directed to the Add Product Page.	As Expected	Pass
Click on 'Orders' Logo	1. Navigate to the Preloved Page. 2. Click on the 'Orders' logo.	1. User should be directed to the Orders Page.	As Expected	Pass
Click on 'Purchases' Logo	1. Navigate to the Preloved Page. 2. Click on the 'Purchases' logo.	1. User should be directed to the Purchases Page.	As Expected	Pass
Validate Logo Visibility and Accessibility	1. Navigate to the Preloved Page. 2. Ensure all the aforementioned logos are visible and not overlapped or obstructed by any other elements. 3. Try to click on each of the logos to ensure they are	1. All logos should be clearly visible, accessible, and responsive to user interaction.	As Expected	Pass

	clickable and not just static images.			

Table 6.1.40 Test Scenario: Validate Functionality of Product Management Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Load 'All' Products	1. Navigate to the Product Management Page. 2. Click on the 'All' tab.	1. All the products regardless of their status should be displayed.	As Expected	Pass
Load 'Active' Products	1. Navigate to the Product Management Page. 2. Click on the 'Active' tab.	1. Only products with an 'Active' status should be displayed.	As Expected	Pass
Load 'Inactive' Products	1. Navigate to the Product Management Page. 2. Click on the 'Inactive' tab.	1. Only products with an 'Inactive' status should be displayed.	As Expected	Pass
Load 'Deleted' Products	1. Navigate to the Product Management Page. 2. Click on the 'Deleted' tab.	1. Only products with a 'Deleted' status should be displayed.	As Expected	Pass

Toggle Product Status from Active to Inactive	1. Navigate to the Product Management Page. 2. Click on the 'Active' tab. 3. Choose any product from the list. 4. Use the toggle button to switch the product status to 'Inactive'.	1. The product's status should be updated to 'Inactive' in database. 2. The product should disappear from the 'Active' tab and should now be visible in the 'Inactive' tab.	As Expected	Pass
Toggle Product Status from Inactive to Active	1. Navigate to the Product Management Page. 2. Click on the 'Inactive' tab. 3. Choose any product from the list. 4. Use the toggle button to switch the product status to 'Active'.	1. The product's status should be updated to 'Active' in database. 2. The product should disappear from the 'Inactive' tab and should now be visible in the 'Active' tab.	As Expected	Pass

Table 6.1.41 Test Scenario: Validate Deleted Product Functionality on Product Management Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
View Deleted Products	1. Navigate to the Product Management Page. 2. Click on the 'Deleted' tab.	1. Only products with a 'Deleted' status should be displayed. 2. The toggle button should be invisible for these products. 3. A 'Restore' text/link should be visible for each deleted product.	As Expected	Pass
Restore a Deleted Product	1. Navigate to the Product Management Page. 2. Click on the 'Deleted' tab. 3. Choose any product from the list. 4. Click on the 'Restore' text/link for that product.	1. The product's status should be updated to 'Active' in database. 2. The product should disappear from the 'Deleted' tab and should now be visible in the 'Active' tab. 3. The toggle button should be visible again for this product in the 'Active' tab.	As Expected	Pass
Automatic Removal of	1. Identify a product that was	1. The identified product should not	As Expected	Pass

Deleted Product after 30 Days	marked as 'Deleted' more than 30 days ago. 2. Navigate to the Product Management Page. 3. Click on the 'Deleted' tab.	be visible in the 'Deleted' tab or any other tabs. 2. The product should be completely removed from the database.		
Retain Deleted Product within 30 Days	1. Identify a product that was marked as 'Deleted' less than 30 days ago. 2. Navigate to the Product Management Page. 3. Click on the 'Deleted' tab.	1. The identified product should be visible in the 'Deleted' tab. 2. The product should not have been removed from the database.	As Expected	Pass

Table 6.1.42 Test Scenario: Verification of Product Details in Product Description Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Viewing Details of a Product in Product Description Page	1. Navigate to the user's product list. 2. Click on a chosen product. 3. Upon redirection to the Product Description Page, observe the displayed product details.	1. All displayed product details on the Product Description Page match the corresponding data in the database.	As Expected	Pass
Counting the Number of Users Who Have Added the Product to their Wishlist	1. Navigate to the Product Description Page of a chosen product. 2. Locate the 'numberofLikesTv' TextView (or the appropriate section/label indicating the number of users who have added the product to their wishlist). 3. Cross-reference the displayed number with the database directly to	1. The number displayed on the Product Description Page matches the count of users who have added the specific product to their wishlist in the database.	As Expected	Pass

	verify accuracy (using a database admin tool or similar).			

Table 6.1.43 Test Scenario: Editing a Product on the Product Description Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Navigate to Edit Product Page	1. Navigate to the Product Description Page. 2. Click on the "Edit" button.	1. User is directed to the Edit Product Page.	As Expected	Pass
Autofill Product Details on Edit Product Page	1. After navigating to the Edit Product Page from the Product Description Page. 2. Observe the fields on the Edit Product Page.	1. All fields (product title, category, price, size, condition, and description) are pre-filled with the current product details from the database.	As Expected	Pass
Validation of Required Fields on Edit Product Page	1. Navigate to the Edit Product Page. 2. Intentionally leave a required field blank. 3. Attempt to save the product changes.	1. The system shows an error message indicating which required fields are missing.	As Expected	Pass

Save Changes to Product on Edit Product Page	1. Navigate to the Edit Product Page. 2. Make changes to some of the product details. 3. Click on the "Save" button.	1. A success message is displayed, indicating the changes have been saved. 2. The modified product details in the database match the edited details.	As Expected	Pass
Verify Updated Product Details on Product Description Page	1. After editing and saving product details, navigate back to the Product Description Page. 2. Observe the updated product details.	1. All displayed product details on the Product Description Page match the newly edited details in the database.	As Expected	Pass

Table 6.1.44 Test Scenario: Deleting a Product from the Product Description Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Delete Button Visibility	1. Navigate to the Product Description Page. 2. Observe the presence of the "Delete" button.	1. The "Delete" button is visible and accessible to the user.	As Expected	Pass

Delete Product Confirmation	1. On the Product Description Page, click the "Delete" button. 2. Observe the displayed dialog or confirmation message.	1. A confirmation dialog/message prompts the user to confirm if they indeed want to delete the product.	As Expected	Pass
Product Deletion and Status Update in Database	1. Confirm the deletion of the product in the confirmation dialog/message. 2. Check the product's status in the database.	1. The product's status in the database is updated to "Deleted."	As Expected	Pass
Timestamp Addition upon Deletion	1. After confirming the deletion of the product, check the product record in the database. 2. Look for the "deleted_timestamp" field.	1. The "deleted_timestamp" field is added to the product record, indicating the exact date and time of deletion.	As Expected	Pass

Table 6.1.45 Test Scenario: Viewing Orders on the Orders Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Display of Orders Matching Current User ID	1. On the Orders Page, observe the listed orders. 2. Verify if all displayed orders match the seller ID with the current user's ID in the database.	1. All displayed orders belong to the current logged-in user.	As Expected	Pass
Sections Based on Order Status	1. Check the available sections or tabs on the Orders Page.	1. The sections "All", "Pending", "Confirmed", "Shipping", "Delivered", and "Canceled" are present.	As Expected	Pass
Order Segregation Based on Status	1. Click on each section: "Pending", "Confirmed", "Shipping", "Delivered", and "Canceled". 2. Observe the orders displayed in each section.	1. Orders in each section correctly match their respective status. For instance, all orders in the "Pending" section have a status of "Pending" in the database.	As Expected	Pass
Order Count in Each Section	1. Note down the number of orders displayed in each section.	1. The number of orders in each section on the Orders Page matches the	As Expected	Pass

	2. Cross-check with the database to verify the count of orders with matching status.	count of orders with corresponding statuses in the database.		
Order Details Display	1. Click on any order from the list. 2. Observe the details of the order.	1. Essential order details like buyer name, product, order date, price, and others are correctly displayed and match with the database.	As Expected	Pass
"All" Section Display	1. Click on the "All" section. 2. Observe the displayed orders.	1. All orders regardless of their status are displayed in the "All" section.	As Expected	Pass

Table 6.1.46 Test Scenario: Order Detail Page and Managing Orders

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Navigate to Order Detail	1. From the Orders Page, click on any order. 2. Observe the page you are directed to.	1. User is directed to the Order Detail Page, and the details displayed match the data in the database for the selected order.	As Expected	Pass
Cancel Order Flow	1. On the Order Detail Page, click on the "Cancel" button.	1. A confirmation dialog pops up upon clicking "Cancel". 2. The order status changes to	As Expected	Pass

	2. Observe the pop-up confirmation dialog. 3. Click "Yes" on the confirmation dialog. 4. Check the status of the order in the database. 5. Navigate back to the Orders Page and select the "Canceled" section. 6. Check the product's status in the database and its presence in the Marketplace.	"Canceled" in the database. 3. The product status changes from "sold" to "available" in the database. 4. The order appears in the "Canceled" section on the Orders Page. 5. The product is listed again in the Marketplace.		
Confirm Order Flow	1. On the Order Detail Page, click on the "Confirm" button. 2. Observe the pop-up confirmation dialog. 3. Click "Yes" on the confirmation dialog. 4. Check the status of the order in the database. 5. Navigate back to the Orders Page and select the	1. A confirmation dialog pops up upon clicking "Confirm". 2. The order status changes to "Confirmed" in the database. 3. The order appears in the "Confirmed" section on the Orders Page.	As Expected	Pass

	"Confirmed" section.			

Table 6.1.47 Test Scenario: Shipping Process in Order Detail Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Button Visibility on Order Confirmation	1. Navigate to a confirmed order on the Order Detail Page. 2. Observe the visibility of the "Confirm" and "Shipped" buttons.	1. The "Confirm" button is invisible, and the "Shipped" button is visible and functional.	As Expected	Pass
Shipping Details Input Flow	1. Click on the "Shipped" button on a confirmed order. 2. Observe the dialog box that appears. 3. Fill in the "Shipping Company" and "Tracking Number" fields. 4. Click "Save". 5. Check the updated details of the order in the database.	1. A dialog box appears prompting input for the "Shipping Company" and "Tracking Number" fields. 2. After saving, the shipping details are correctly stored in the database.	As Expected	Pass
Display of Shipping Details on	1. Navigate to a confirmed order that has shipping details entered.	1. The "Shipping Company" and "Tracking Number"	As Expected	Pass

Order Detail Page	2. Observe the shipping details section.	are displayed correctly.		
Copying the Tracking Number	1. Next to the displayed "Tracking Number" on the Order Detail Page, click the "Copy" icon. 2. Try pasting the copied value elsewhere (e.g., in a notepad or other text field).	1. The copied value matches the "Tracking Number" from the order details.	As Expected	Pass
Mandatory Fields Check on Shipping Dialog	1. Click on the "Shipped" button on a confirmed order. 2. Without filling in any fields, try clicking "Save".	1. The system notifies the user that both fields ("Shipping Company" and "Tracking Number") are mandatory before saving.	As Expected	Pass

Table 6.1.48 Test Scenario: Order Delivery Confirmation in Order Detail Page

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Button Visibility on Order Shipment	1. Navigate to a shipped order on the Order Detail Page. 2. Observe the visibility of the "Cancel",	1. The "Cancel" and "Shipped" buttons are invisible, and the "Delivered" button is visible and functional.	As Expected	Pass

	"Shipped", and "Delivered" buttons.			
Delivery Confirmation Flow	1. Click on the "Delivered" button on a shipped order. 2. Observe the confirmation dialog box that appears. 3. Click "Yes" on the confirmation dialog. 4. Check the updated status of the order in the database and on the Order Detail Page.	1. A confirmation dialog box appears to validate the delivery status change. 2. After confirming, the order status is updated to "completed" in the database and the order is displayed in the Delivered section.	As Expected	Pass
Display of Delivered Date on Order Detail Page	1. Navigate to a completed order on the Order Detail Page. 2. Observe the shipping details section.	1. The "Delivered Date" is displayed correctly and matches the date and time when the user confirmed the order as delivered.	As Expected	Pass
Checking Order Sections After Delivery Confirmation	1. Confirm the delivery of a shipped order by clicking on the "Delivered" button. 2. Navigate to different sections: "Shipping" and "Delivered".	1. The order is no longer displayed in the "Shipping" section and has moved to the "Delivered" section.	As Expected	Pass
Non-interference of	1. Navigate to an order that is not in	1. The "Delivered" button should not be	As Expected	Pass

Other Order Statuses	the "Shipped" status (e.g., "Pending" or "Confirmed"). 2. Observe the visibility and functionality of the "Delivered" button.	visible or functional for orders that are not in the "Shipped" status.		

Table 6.1.49 Test Scenario: Verification of the categorization and display of purchase items based on their order status in the Purchases Page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Display of Purchase Items Based on Their Status in Purchases Page	1. Navigate to the Purchases Page. 2. In the "To Confirm" section, verify that only purchase items with the order status "Processing" are listed. 3. In the "To Ship" section, verify that only purchase items with the order status "Confirmed" are listed. 4. In the "To Receive" section, verify that only purchase items with	1. All purchase items are correctly categorized and displayed in their corresponding sections based on their order status.	As Expected	Pass

	the order status "Shipped" are listed. 5. In the "Completed" section, verify that only purchase items with the order status "Delivered" are listed. 6. In the "Cancelled" section, verify that only purchase items with the order status "Cancelled" are listed.			

Table 6.1.50 Test Scenario: Verification of the cancel purchase functionality in the "To Confirm" section of the Purchases Page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
Initiate Cancel Process for a Purchase Item	1. Navigate to the "To Confirm" section. 2. Click on the cancel button of the desired purchase item.	1. A dialog pops up prompting the user to select a reason for cancellation.	As Expected	Pass
Cancel Purchase with a Reason Selection	1. Select a reason from the dropdown. 2. Click save.	1. Dialog closes. 2. The order status in the database is updated to "Canceled".	As Expected	Pass

		3. The selected reason is stored in the database. 4. The purchase item is no longer displayed in the "To Confirm" section and now appears in the "Canceled" section.		
Cancel Purchase without a Reason Selection	1. Do not select a reason. 2. Try clicking save.	1. An error message or prompt appears requiring the user to select a reason before proceeding.	As Expected	Pass
Navigation after Purchase Cancellation	1. Navigate to the "Canceled" section.	1. The recently canceled purchase item is displayed in the "Canceled" section with the corresponding reason.	As Expected	Pass

Table 6.1.51 Test Scenario: Verification of purchase items display and functionality in the "To Ship" section of the Purchases Page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
View Purchase Item Details in "To Ship" Section	1. Navigate to the "To Ship" section.	1. Purchase items in this section have the text "Seller is preparing to ship your parcel."	As Expected	Pass

		2. A cancel button is displayed alongside each purchase item.		

Table 6.1.52 Test Scenario: Verification of purchase items display and functionality in the "To Receive" section of the Purchases Page.

Test Case	Test Steps	Expected Result	Actual Result	Pass/Fail
View Purchase Item Details in "To Receive" Section	1. Navigate to the "To Receive" section.	1. Purchase items in this section display the text "Parcel has been shipped by seller." 2. The cancel button is not visible. 3. A "Received" button is displayed alongside each purchase item.	As Expected	Pass
Confirm Receipt of Purchase in "To Receive" Section	1. Navigate to the "To Receive" section. 2. Click on the "Received" button of the desired purchase item. 3. Confirm Receipt of Purchase in "To Receive" Section	1. A confirmation dialog pops up prompting the user to confirm that they have received the purchase item. 2. Dialog closes. 3. The order status in the database is updated to "Delivered." 4. The purchase item is no longer	As Expected	Pass

		displayed in the "To Receive" section and now appears in the "Completed" section.		
Navigation after Confirming Receipt of Purchase from "To Receive" Section	1. Navigate to the "Completed" section.	1. The recently confirmed purchase item is displayed in the "Completed" section.	As Expected	Pass

Table 6.1.53 Test Scenario: Verification of purchase items display and functionality in the "Completed" section of the Purchases Page.

Test Case	**Test Steps**	**Expected Result**	**Actual Result**	**Pass/Fail**
View Purchase Item Details in "Completed" Section	1. Navigate to the "Completed" section.	1. Purchase items in this section display the text "Parcel has been delivered." 2. The "Cancel" and "Received" buttons are not visible for each purchase item.	As Expected	Pass

6.2 User Testing

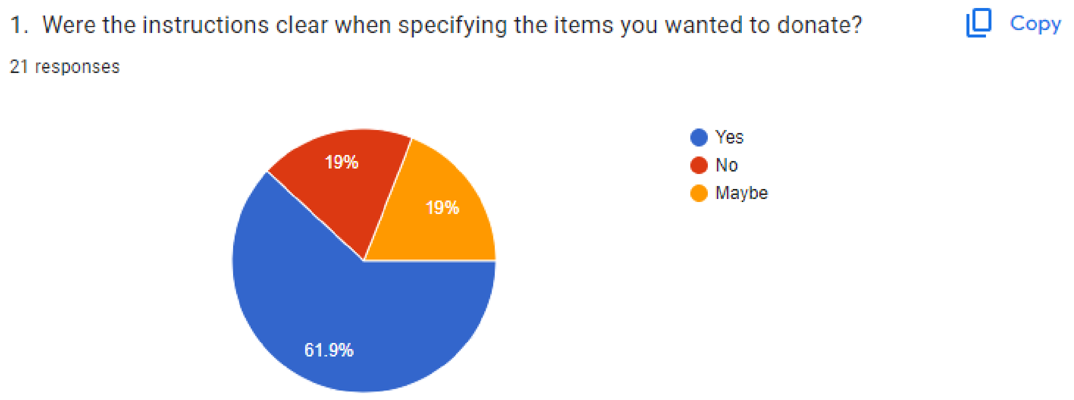


Figure 6.2a: User Testing Response 1

The data collected from user testing regarding the clarity of instructions for specifying donation items provides several insights. The majority, with 61.9% of respondents, felt that the instructions were clear. This is a positive indication that, for most users, the process or interface to specify donation items is intuitive and easy to understand.

However, there's room for improvement. There's a noticeable group of users, about 19%, who found themselves in the middle ground, responding with "Maybe". This suggests that while they didn't find the process entirely baffling, there are certain elements or aspects that might benefit from more clarity or simplification.

Another 19% found the instructions to be unclear. Even though this is a minority, it's still a significant portion that cannot be overlooked. It signifies a clear need for refinement in the instructions or process.

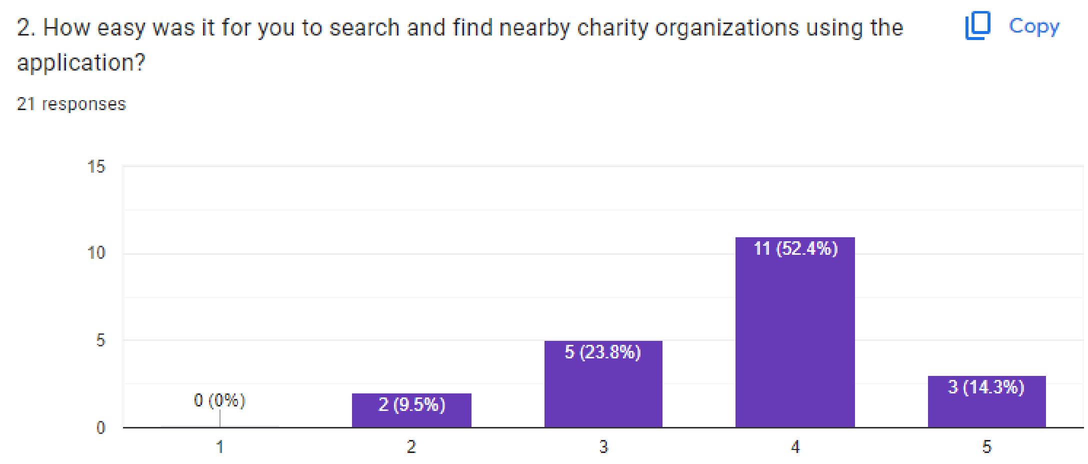


Figure 6.2b: User Testing Response 2

From the data, it's evident that the majority of users found the application's searching mechanism relatively easy to use. Specifically, more than half of the respondents (52.4%) rated the ease of searching and finding nearby charity organizations as a 4 on a scale of 5. This is a positive sign indicating that the user interface and the underlying search algorithm are generally effective. On the flip side, there's a segment (around 33.3%) that gave a middling to lower score (2 or 3 out of 5). This suggests that while the application might be working for the majority, there's still a subset of users who are encountering challenges or feel there's room for improvement.

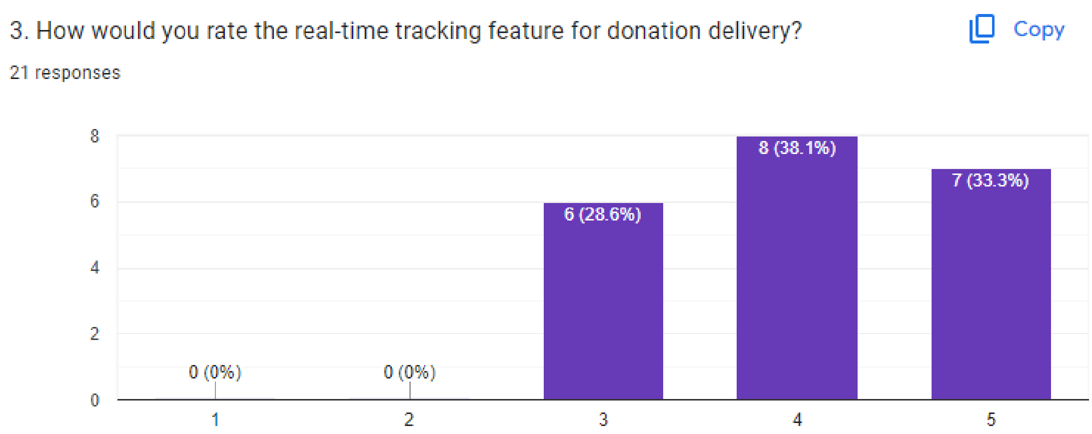


Figure 6.2c: User Testing Response 3

A majority of users, 71.4%, positively received the real-time tracking feature, indicating that it effectively meets user expectations and provides a satisfactory experience. The nearly equal distribution of ratings at 4 (38.1%) and 5 (33.3%) suggests a strong endorsement of the feature's utility and user-friendliness.

However, 28.6% of respondents gave a neutral score. This could hint at minor issues they faced or perhaps certain expectations that weren't fully met. This segment of feedback is crucial as it provides room for improvement. Perhaps the tracking may occasionally lag, or users might desire more granular updates.

In conclusion, the real-time tracking feature is clearly valuable to the majority of users, but addressing the concerns of the neutral feedback group can elevate the user experience even further.

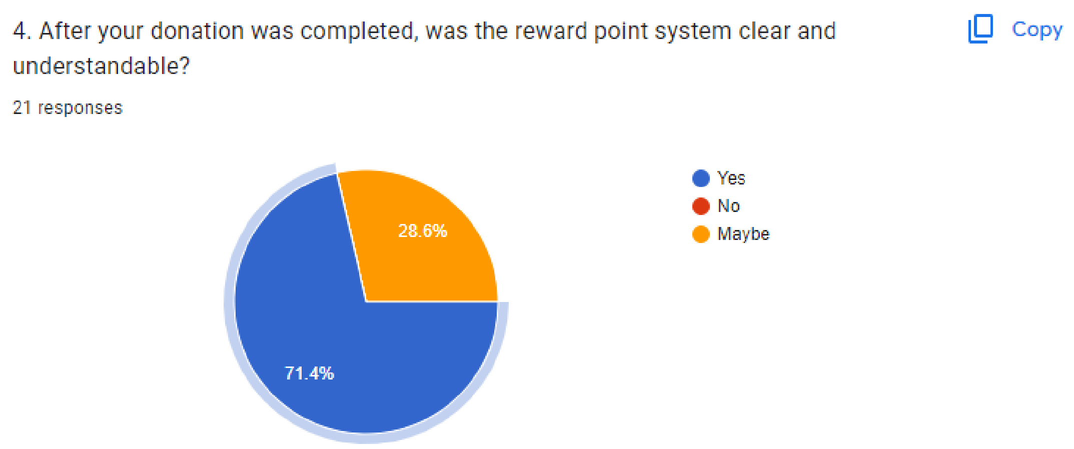


Figure 6.2d: User Testing Response 4

Most users, 71.4%, found the reward point system to be clear and understandable, indicating a general transparency in how the points are calculated and awarded. This signifies a good design and user-friendly system.

Nevertheless, there remains 28.6% of users who were unsure about its clarity. Given that the points are awarded based on the quantity of donation items, it's possible these users might be unsure about the tiered reward structure or how the points scale with the quantity of items donated.

Conclusively, while the reward point system seems straightforward to a majority of users, it might be beneficial to enhance the system's explanations or visuals to further aid understanding, ensuring that all users are fully informed.

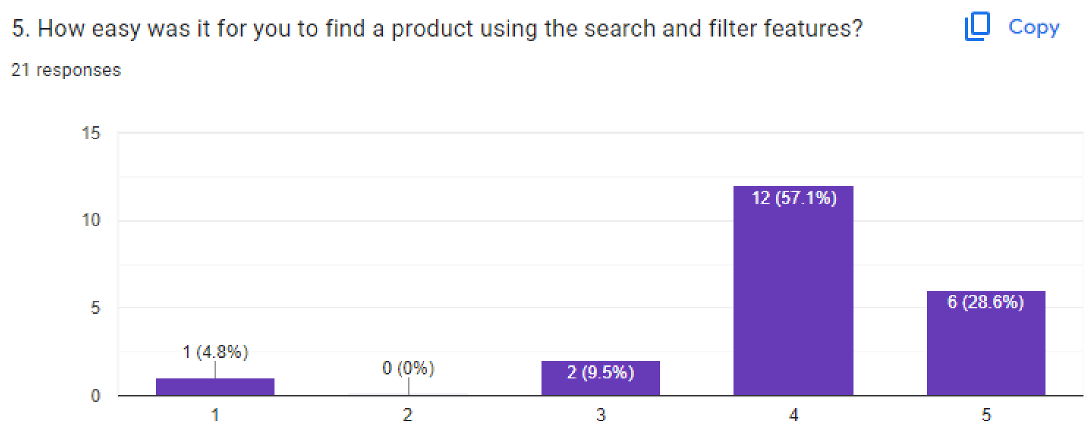


Figure 6.2e: User Testing Response 5

A substantial 85.7% of users rated the search and filter functionalities as easy or very easy to use, with ratings of 4 and 5 respectively. Only a small proportion, 4.8%, found the feature somewhat challenging, and 9.5% were neutral.

The search functionality, which targets the product name, seems to cater to users' primary needs. The exclusive filter based on product category seems to be effective for most users. However, there might be room for enhancement, especially since a segment of users gave a rating of 3 or below.

Overall, while the search and filter tools are generally user-friendly, considering the addition of more intricate filtering options could cater to a broader spectrum of user preferences and needs.

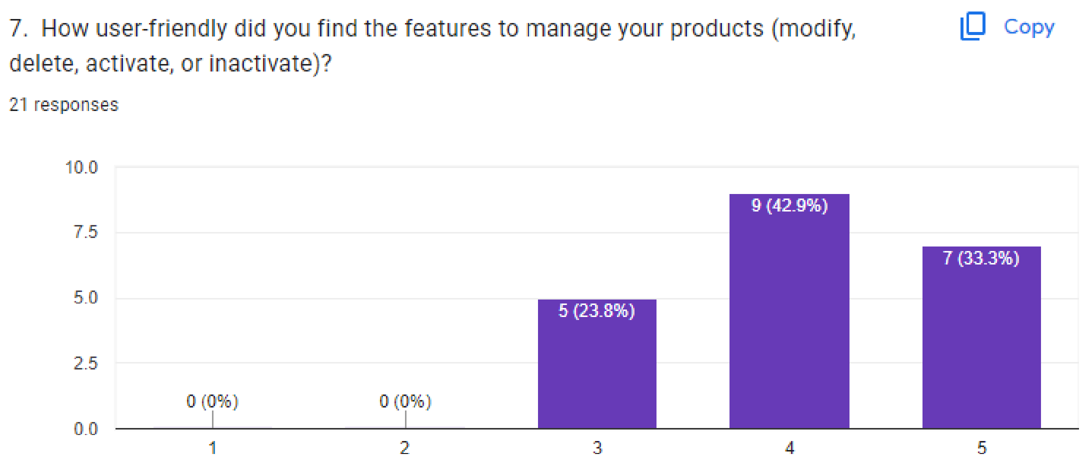


Figure 6.2f: User Testing Response 6

A majority of users, totalling 76.2%, found the features to manage their products to be user-friendly, with 42.9% rating it as easy and 33.3% as very easy. Conversely, 23.8% of users felt neutral about the functionalities. Interestingly, no users reported finding the features difficult or very difficult to use.

In essence, the features for product management, including modifying, deleting, and toggling between active and inactive states, seem to be well-designed and user-centric. Still, some adjustments or improvements might be worth considering to convert those neutral users into satisfied ones.

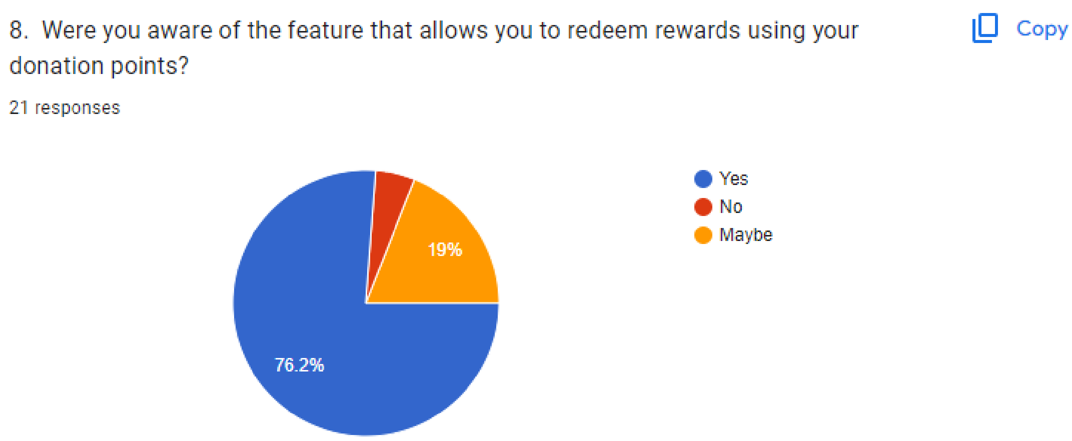


Figure 6.2g: User Testing Response 7

A significant portion, 76.2%, of the users were aware of the reward redemption feature based on their donation points. However, 4.8% were not familiar with this feature at all, and an additional 19% were unsure. This indicates that while the majority are informed, there's still a segment of users either uncertain or unaware. To enhance user experience and participation, clearer communication or more prominent feature highlighting might be beneficial.

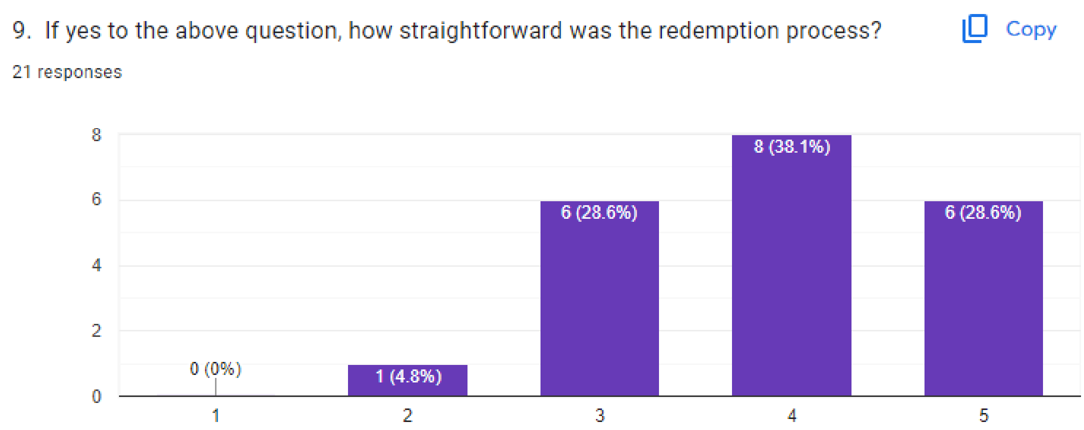


Figure 6.2h: User Testing Response 8

From the responses to Question 9, the majority of users found the redemption process either straightforward or very straightforward, with 66.7% rating it 4 or 5. This indicates that the redemption process in the app is relatively user-friendly for most participants.

However, there's still a significant portion, 28.6%, who gave it a middling score of 3. This suggests that while they didn't find the process especially difficult, there might be aspects that could be refined or clarified to enhance user understanding and ease. The 4.8% rating it as 2 indicates a small fraction of users had more significant issues with the process. It could be valuable to gather qualitative feedback from these users to pinpoint the exact difficulties they faced.

Incorporating the aforementioned suggestion of displaying the points directly on the reward screen could also improve the clarity of the redemption process. Overall, while the results are predominantly positive, there's always room for refining and enhancing the user experience.

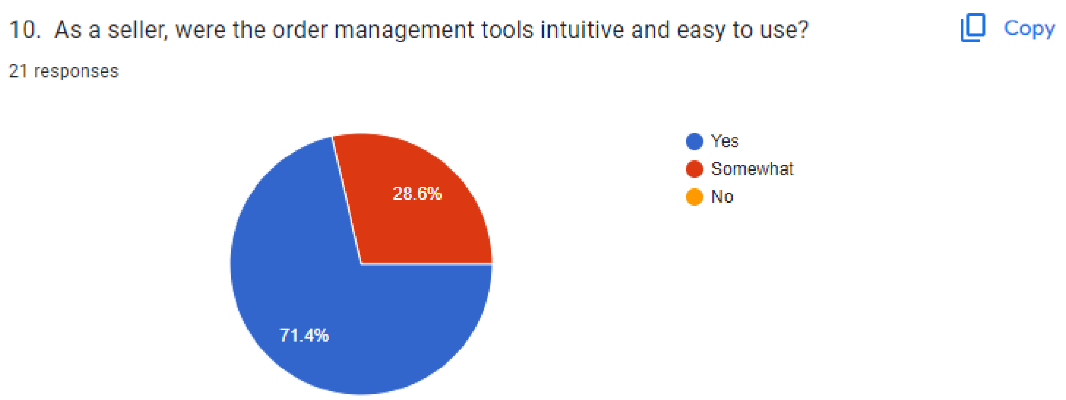


Figure 6.2i: User Testing Response 9

A vast majority, 71.4%, responded with "Yes", indicating that they found the order management tools both intuitive and easy to use. This feedback suggests that the design and functionality of these tools are largely aligned with users' expectations and requirements.

Meanwhile, 28.6% found the tools "Somewhat" intuitive and easy, suggesting that while they did not face significant challenges, there might be certain elements or features that could be refined or further improved upon to enhance their usability.

The absence of negative feedback ("No" responses) is a good sign. However, the "Somewhat" responses hint that there could be areas of improvement. It would be beneficial to further probe or conduct more in-depth user testing with this segment to ascertain what specific aspects of the tool might need tweaking or additional features.

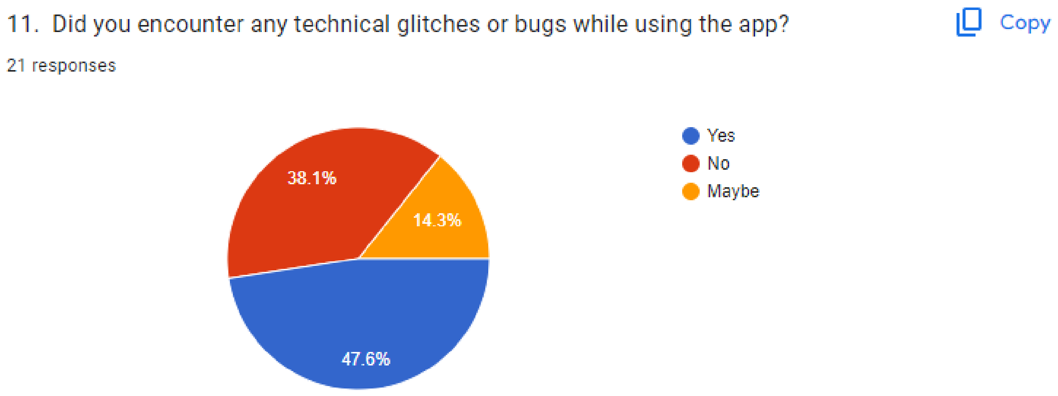


Figure 6.2j: User Testing Response 10

Almost half of the respondents, 47.6%, reported encountering technical glitches or bugs during their use of the app. This is a significant proportion and points to the need for immediate attention.

38.1% did not experience any such issues, suggesting that the experience may vary between users, potentially due to device differences, network conditions, or other variables. The 14.3% who responded with "Maybe" can be seen as a segment that's unsure about the issues they faced, or whether they can categorize them as glitches or bugs. This ambiguity can arise when users face minor disruptions they aren't sure to attribute to the app or external factors.

The mention of the app stopping when the internet isn't stable is a concern, especially for an app that heavily relies on real-time tracking. Delays or glitches in the Google map feature, particularly in showing the delivery driver's location, can lead to user dissatisfaction and potentially reduce trust in the app's efficiency.

In conclusion, there's a need to focus on improving the app's stability, particularly in areas of internet connectivity. Enhancing the app's resilience to variable network conditions and optimizing the real-time tracking feature should be prioritized to offer a seamless user experience.

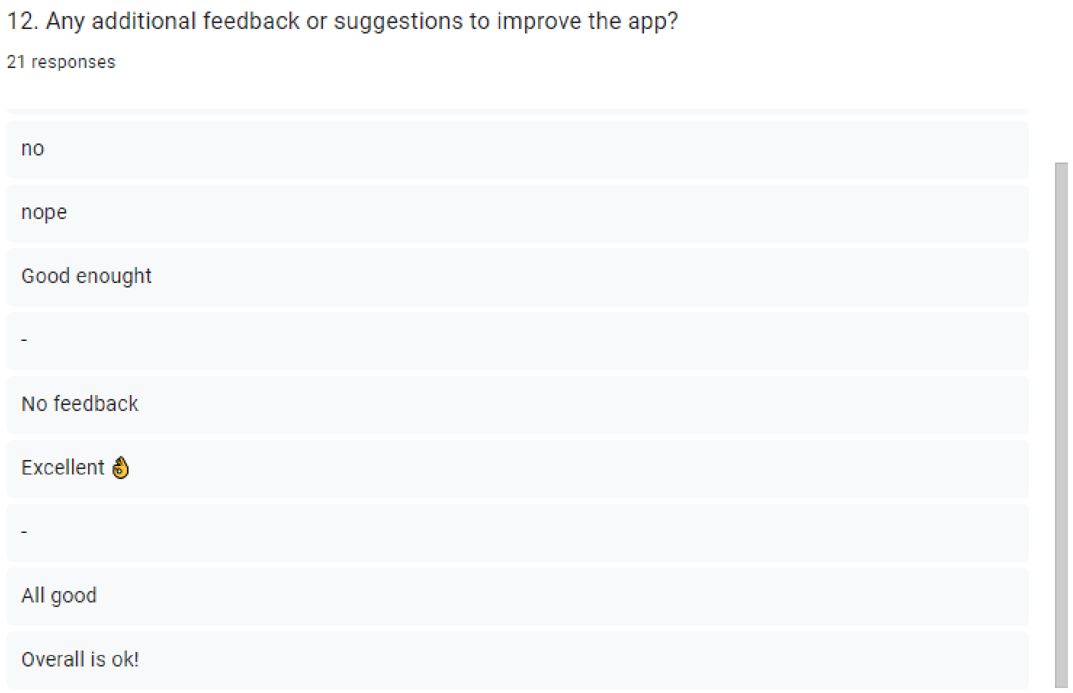


Figure 6.2k: User Testing Response 11

The majority of responses seem to indicate satisfaction with the app's current state. Words and phrases like "no," "nope," "Good enough," "No feedback," "Excellent," "All good," and "Overall is ok!" suggest that most users are content with their experience. There aren't any specific suggestions for improvement or negative feedback in this set of responses. Such overwhelmingly positive or neutral feedback can be taken as a testament to the app's functionality and user experience.

6.3 Objective Evaluation

The Online Second-hand Clothing Selling and Donation System, developed in Android Studio, seamlessly blends technology with social responsibility to foster sustainable clothing practices. Users can conveniently donate to local charities within a 10km radius, while real-time tracking via Google Maps ensures transparency in deliveries. The marketplace aspect encourages reuse of clothing, offering an intuitive listing process, detailed product insights, and efficient search tools that enhance user trust and engagement. The comprehensive profile dashboard allows users to effortlessly oversee all their activities, fostering a sense of control. A standout feature is the reward system, where donors earn points redeemable for offers at popular outlets like KFC or Starbucks, turning the act of donating into both a fulfilling and rewarding experience.

Objective 1: To provide a mobile application that consists of multiple functions for the user who did not know how to deal with their old clothes, thereby, reduce the rate of “throwaway” culture.

- Achievement: The mobile app effectively addresses the challenge faced by users who are unsure about what to do with their old clothes. By offering them a platform to donate or sell their second-hand garments, this system provides an alternative to simply discarding them. The marketplace segment specifically offers an eco-friendly platform for individuals to give their clothes a new lease of life. This directly combats the prevalent "throwaway" culture by offering a solution that values reusability and sustainability.

Objective 2: To develop an online secondhand clothes selling and donation mobile application that offers a comprehensive solution for users to efficiently manage their used clothing, including seamless integration of selling and donating options, thereby addressing the limitations of existing systems and promoting sustainable practices.

- Achievement: The system is designed as a comprehensive solution for both selling and donating old clothes. The seamless integration of these options is evident in the user's ability to quickly list items in the marketplace, and simultaneously, choose to donate clothes to nearby charitable organizations. The real-time tracking feature and the provision for charities to accept or reject donations adds to the system's efficiency. The app, as a whole, addresses the limitations of existing systems by providing a platform that not just facilitates transactions but also promotes sustainable practices.

Objective 3: To enhance the user experience by implementing a user-friendly interface with advanced filtering and search capabilities, as well as incorporating a reward system that encourages users to donate their used clothing, ultimately reducing textile waste and providing a convenient platform for users to contribute to a more sustainable environment.

- Achievement: The user-centric design of the app shines through in multiple features. Advanced filtering and search capabilities embedded in the marketplace ensure users can find products efficiently, providing a smooth shopping experience. Meanwhile, the reward system gamifies the donation process, making it more enticing for users. The very act of offering tangible rewards for donations not only encourages more users to donate but also reiterates the app's commitment to sustainability. By doing so, the app does more than just offer a platform; it encourages behaviors that reduce textile waste and push for a sustainable environment.

CHAPTER 7 Conclusion

7.1 Project Review

The development of an online secondhand clothes selling and donation system on a mobile platform, complete with an array of features, offers a comprehensive solution to address various social, economic, and environmental concerns. By leveraging modern technology to create an integrated and user-friendly platform for buying, selling, and donating secondhand clothes, user can facilitate a more sustainable, responsible, and inclusive approach to managing their wardrobe needs.

As the global focus on environmental sustainability and waste reduction continues to gain traction, the implementation of a secondhand clothes selling and donation platform becomes increasingly relevant. By facilitating the circulation of secondhand garments, the system aids in reducing the demand for new clothing production, subsequently minimizing the textile industry's environmental footprint. Additionally, by prolonging the life cycle of garments, this platform actively contributes to reducing the volume of textiles that end up in landfills.

First, the e-marketplace feature of this platform enables users to buy and sell secondhand clothes efficiently, thereby promoting a more sustainable approach to consumerism. By providing an avenue for individuals to trade pre-owned garments, the system encourages the reuse and recycling of clothing, ultimately reducing the textile industry's environmental impact and extending the life cycle of garments. Additionally, buyers can benefit from acquiring quality items at a lower cost, while sellers can monetize clothing they no longer need.

Furthermore, the online donation feature supports social responsibility by allowing users to contribute to their communities and help those in need. By offering the ability to select charity organizations within a 10 km radius, the platform ensures that donations are localized and accessible, directly benefiting the local community. This not only fosters a sense of community but also ensures that donations are effectively targeted to address the most pressing needs. Besides, the contactless delivery option further enhances the platform's appeal, particularly in the context of public health concerns. This feature allows users to safely donate clothing while minimizing the risk of viral transmission, ensuring that users feel confident and protected throughout the donation process.

Additionally, the donation tracking feature provides transparency, enabling donors to follow the progress of their contributions and ensuring that donations reach their intended recipients. This increased visibility helps to build trust and encourages further engagement with the platform, as users can see the direct impact of their donations on the lives of others.

Nevertheless, the reward system for donations creates an added incentive for users to actively participate in the donation process. By offering tangible benefits and recognition for their generosity, the platform motivates users to continue contributing and promoting the platform's overall mission of sustainability, social responsibility, and community support.

The mobile platform's accessibility and user-friendly interface make the system appealing to a wide audience, including individuals who may not have extensive experience with technology. With the increasing prevalence of smartphones and mobile devices, this platform is well-positioned to reach a vast number of potential users. As the platform can be accessed anytime and anywhere, it provides users with the convenience and flexibility they need in today's fast-paced world.

In summary, the development of an online secondhand clothes selling and donation system on a mobile platform, featuring an e-marketplace, online donation, charity organization selection, contactless delivery, donation tracking, and a reward system, offers a multi-faceted solution to address the challenges faced by today's society. By embracing innovative technology and creating a comprehensive, user-friendly platform, user can foster a more sustainable, responsible, and inclusive approach to clothing consumption. This platform holds significant potential for positive impact on individuals, communities, and the environment, and its versatile features ensure its relevance and value for years to come.

7.2 Limitations

The online second-hand clothing selling and donation system, while filled with promise, is not without its challenges. A critical limitation that users might face is the system's dependency on a stable internet connection. Users have reported instances where the app closes by itself when faced with connectivity fluctuations. Additionally, as the volume of data grows, the platform sometimes exhibits slower loading times, which could potentially deter user engagement. An added layer of complexity arises when, despite data being stored in the Firebase Realtime Database, the app occasionally displays empty values, necessitating users to navigate back and retry to view the information correctly. This could stem from synchronization lags or from the nuances of data retrieval in a real-time environment. The system's real-time tracking, despite its integration with Google Maps, is also susceptible to occasional inaccuracies or delays. Security, while paramount, carries inherent risks in a digital landscape, especially concerning transactions and personal data. While these limitations pose challenges, they also spotlight areas ripe for future improvement.

7.3 Future Enhancement

In the evolving digital landscape of the second-hand clothing selling and donation system, there are ample opportunities for enhancement. One primary concern that users face is the system's vulnerability to unstable internet connections. To address this, it would be prudent to incorporate a more robust error-handling mechanism. By doing so, the app would have the capability to detect and respond to connectivity issues in real-time, ensuring that users are immediately alerted of the problem without the app shutting down abruptly. An even more ambitious yet invaluable improvement would be the introduction of an offline mode. This mode would enable users to access certain core functionalities of the app even in the absence of an active internet connection, making the user experience more seamless and less contingent on external factors like connectivity.

Another area ripe for enhancement is the speed and efficiency of data retrieval. With the growth of the platform, the larger datasets inevitably lead to slower loading times, potentially hampering user engagement. To circumvent this, performance optimization techniques could be employed. By leveraging the power of database indexing and optimizing queries, the app can markedly reduce retrieval times. A cache mechanism, which stores frequently accessed data temporarily for quick access, can be another feather in the cap, ensuring that users can access their most common functionalities swiftly.

The real-time tracking feature of the system, while revolutionary, can be taken a notch higher. With the integration of supplemental geolocation services, the system can have a redundancy in place. This means that even if one service falters, another can take over, ensuring continuous, accurate, and timely location updates. Furthermore, while the current integration with Google Maps is commendable, considering other mapping services or enhancing the existing integration can further refine the accuracy and reliability of tracking.

In the digital age, security remains paramount. The platform's users entrust it with their personal and, often, financial details. As a commitment to them, the app can bolster its security by incorporating end-to-end encryption, especially for sensitive transactional data. This would mean that data, while in transit, remains encrypted and decipherable only by the intended recipient. However, the evolving nature of cyber threats necessitates regular security audits and penetration tests, ensuring that the platform's defenses are continually updated and fortified against potential breaches.

Lastly, a system can only be as good as its adaptability to user needs. To ensure the app continually evolves and stays attuned to its user base, it would be beneficial to implement a comprehensive feedback mechanism. This would empower users to voice their concerns, report issues, and most importantly, suggest improvements. Adopting this iterative approach, where the app undergoes refinements based on real-world feedback, ensures that it not only addresses its current challenges but also aligns seamlessly with market demands and user expectations in the future.

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APPENDIX

Questionnaire Sample

Understanding the Potential of Adding a Donation Feature for Secondhand Clothes on E-commerce Platforms: A Survey of User Perceptions and Attitudes

Dear Respondent,

I am Wong Teng Wei, final year undergraduate of Bachelor of Information Systems (Hons) Information Systems Engineering in Universiti Tunku Abdul Rahman (UTAR) Kampar Campus.

I am conducting research on the *potential of adding a donation feature to e-commerce platforms* like Lazada and Shopee to solve the issue of secondhand clothes that have been in the e-marketplace for an extended period. **This survey aims to gather feedback on the need for this system and what features would make it user-friendly and efficient.**

There are 4 sessions of the questionnaire that you will need to complete for this project.
Session 1: Socio-demographic information
Session 2: Experience with secondhand clothes on e-commerce platforms
Session 3: Attitudes towards donating secondhand clothes on e-commerce platforms
Session 4: Perceptions and expectations of a donation feature for secondhand clothes on e-commerce platforms

The survey will take approximately 10-15 minutes to complete. Your responses will remain anonymous, and the information we gather will only be used for research purposes.

Thank you for your time and input. Your contribution is valuable to my final year project.

NOTICE: Kindly be reminded that all of the information and data collected in this research will be kept in confidential at all times. Your participation in this research study should be completely voluntary.

If you have any enquiries on this research study, kindly contact me Wong Teng Wei at my phone number 016-9289983 or at my email tengwei101@1utar.my.

* Required

Personal Data Protection Statement

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, University Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

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- For processing any benefits and services
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- For advertorial and news
- For general administration and record purposes
- For enhancing the value of education
- For educational and related purposes consequential to UTAR
- For the purpose of our corporate governance
- For consideration as a guarantor for UTAR staff/student applying for his/her scholarship/ study loan

2. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

3. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

4. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing struct policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
1. By submitting this form, you hereby authorise and consent to us processing (including disclosing) your personal data and any updated of your information, for the purposes and/or for any updates of your information, for the purpose and/or for any other purposes related to the purpose.

2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfil our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

3. You may access and update you personal data by writing to me at tengwei101@gmail.com.

1. Acknowledge of Notice *

Mark only one oval.

- ⬭ I have been notified and that I hereby understood, consented and agreed per UTAR above notice. *Skip to question 2*
- ⬭ I disagree, my personal data will not be processed. *Skip to section 7 (**You have completed the questionnaire. Please click the submit button**)*

Session 1: Socio-demographic information

Please complete this part and select the most relevant option.

2. Gender *

Mark only one oval.

- ⬭ Male
- ⬭ Female
- ⬭ Other: ____________________

3. Age *

Mark only one oval.

- ⬭ Below 20 years old
- ⬭ 21 to 30 years old
- ⬭ 31 to 40 years old
- ⬭ 41 to 50 years old
- ⬭ 51 to 60 years old
- ⬭ Above 60 years old

4. Race *

Mark only one oval.

- Chinese
- Malay
- Indian
- Other: ______________________

5. Occupation *

Mark only one oval.

- Student
- Employed
- Self-employed
- Retired
- Unemployed
- Other: ______________________

6. Monthly Income *

Mark only one oval.

- Below RM2000
- RM2001 to RM3000
- RM3001 to RM4000
- RM4001 to RM5000
- RM5001 and above

7. Are you familiar with e-commerce platforms like Lazada or Shopee? *

Mark only one oval.

- Yes
- No
- Maybe

8. How often do you use e-commerce platforms like Lazada or Shopee? *

Mark only one oval.

- Daily
- Weekly
- Monthly
- Rarely
- Never

Session 2: Experience with secondhand clothes on e-commerce platforms

Please complete this part and select the most relevant option.

9. 1. Have you ever bought secondhand clothes on e-commerce platforms? *

Mark only one oval.

- Yes
- No

10. 2. Have you ever sold secondhand clothes on e-commerce platforms? *

Mark only one oval.

- Yes
- No

11. 3. How long have you been using e-commerce platforms to buy or sell secondhand clothes? *

Mark only one oval.

- Less than 6 months
- 6 - 12 months
- 1 - 2 years
- 2 - 3 years
- More than 3 years

12. 4. Have you ever had a negative experience buying or selling secondhand clothes on e-commerce platforms? If so, can you describe it? *

____

____

____

____

____

13. 5. What types of secondhand clothes do you usually buy or sell on e-commerce platforms? *

Mark only one oval.

- Clothing
- Shoes
- Accessories (e.g. bags, jewelry)
- Other: ____________________

Session 3: Attitudes towards donating secondhand clothes on e-commerce platforms

Please complete this part and select the most relevant option.

14. 6. Would you consider donating your secondhand clothes on e-commerce platforms if there was an option available? *

Mark only one oval.

- Yes
- No

15. 7. What would motivate you to donate your secondhand clothes on e-commerce platforms? *

Check all that apply.

- [ ] Supporting a good cause
- [ ] Reducing waste
- [ ] Making space in my closet
- [ ] Get incentive (e.g. Reward Point)
- [ ] Other: ____________________

16. 8. Would you be more likely to donate your secondhand clothes if you knew that they were going to a specific cause or organization? *

Mark only one oval.

- Very important
- Somewhat important
- Not very important
- Not at all important

17. 9. Would you be willing to pay a small fee (RM1 or 2) to donate your secondhand clothes on e-commerce platforms? *

Mark only one oval.

- Yes
- No
- Maybe

18. 10. Some secondhand clothes have been present on e-commerce platforms for over 5 years and are still unsold. Is it possible to solve this problem by implementing a donation system? *

Mark only one oval.

- Yes
- No
- Maybe

Session 4: Perceptions and expectations of a donation feature for secondhand clothes on e-commerce platforms

Please complete this part and select the most relevant option.

19. 11. What features would you expect to see in a donation system for secondhand clothes on e-commerce platforms? *

Check all that apply.

- [ ] Option to choose the charity or organization to donate to
- [ ] Estimated value of the donated items for tax purposes
- [ ] Tracking system for the donated items
- [ ] Notification system to confirm the donation has been received
- [ ] Option to schedule a pickup for the donated items
- [ ] Other: ____________________

20. 12. Would you be interested in receiving incentives for donating your secondhand clothes on e-commerce platforms? *

Mark only one oval.

- Yes, I would be interested in receiving incentives
- No, I would not be interested in receiving incentives
- It depends on the type of incentives

21. 13. Would you be willing to donate to an organization that resells donated items for profit, or do you prefer that the items go directly to those in need? *

Mark only one oval.

- I prefer that the items go directly to those in need.
- I am okay with donating to an organization that resells donated items for profit.

22. 14. Would you be willing to share your donation history on social media to promote the cause and encourage others to donate? *

Mark only one oval.

- Yes, I would be willing to share my donation history on social media.
- No, I would not be comfortable sharing my donation history on social media.

23. 15. Would you be more likely to donate if the donation system provided you with an estimated value for your secondhand clothes? *

Mark only one oval.

- Yes, I would be more likely to donate if the donation system provided me with an estimated value for my secondhand clothes.
- No, it would not make a difference in my decision to donate.

24. 16. How important is it for the donation system to have a user rating or feedback system to rate the charities or organizations receiving the donations? *

Mark only one oval.

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

25. 17. How likely are you to recommend a donation system for secondhand clothes on e-commerce platforms to your friends and family? *

Mark only one oval.

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

You have completed the questionnaire. Please click the submit button

Thanks for your responses

Hope you have a nice day.😊

User Testing Survey

ONLINE CLOTHES SELLING AND DONATION MANAGEMENT SYSTEM - User Testing Survey

Dear Respondent,

I am student from Faculty of Information and Communication Technology (FICT), in Universiti Tunku Abdul Rahman (UTAR) Kampar Campus.

Thank you for participating in the user testing for the "Online Clothes Selling and Donation Management System" mobile application. Your insights are valuable as my strive to improve this platform for users like you. This application aims to simplify the process of donating secondhand clothing and selling them online. I also appreciate your efforts in making sustainable choices by donating and selling clothes.

This survey will gather feedback on various features of the app, from the donation process to managing marketplace listings. Your honest and constructive feedback will help me enhance the user experience.

* Indicates required question

1. Email *

SeCloth Mobile Application

Personal Data Protection Statement

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- For assessment of any application to UTAR
- For processing any benefits and services
- For communication purposes
- For advertorial and news
- For general administration and record purposes
- For enhancing the value of education
- For educational and related purposes consequential to UTAR
- For the purpose of our corporate governance
- For consideration as a guarantor for UTAR staff/student applying for his/her scholarship/ study loan

2. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

3. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

4. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing struct policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
1. By submitting this form, you hereby authorise and consent to us processing (including disclosing) your personal data and any updated of your information, for the purposes and/or for any updates of your information, for the purpose and/or for any other purposes related to the purpose.

2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfil our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

3. You may access and update you personal data by writing to me at tengwei101@gmail.com.

2. Acknowledge of Notice *

Mark only one oval.

- I have been notified and that I hereby understood, consented and agreed per UTAR above notice. *Skip to question 3*
- I disagree, my personal data will not be processed. *Skip to section 4 (**You have completed the user testing survey. Please click the submit button**)*

3. 1. Were the instructions clear when specifying the items you wanted to donate? *

Mark only one oval.

- Yes
- No
- Maybe
- Other: __________

4. 2. How easy was it for you to search and find nearby charity organizations using the application? *

Mark only one oval.

Difficult
1 ⬭
2 ⬭
3 ⬭
4 ⬭
5 ⬭
Very Easy

5. 3. How would you rate the real-time tracking feature for donation delivery? *

Mark only one oval.

Poor
1 ⬭
2 ⬭
3 ⬭
4 ⬭
5 ⬭
Excellent

6. 4. After your donation was completed, was the reward point system clear and understandable? *

Mark only one oval.

- ⬭ Yes
- ⬭ No
- ⬭ Maybe

7. 5. How easy was it for you to find a product using the search and filter features? *

Mark only one oval.

Difficult

1

2

3

4

5

Very Easy

8. 6. how easy can u find a product using the search and filter features? *

Mark only one oval.

Difficult

1

2

3

4

5

Very Easy

9. 7. How user-friendly did you find the features to manage your products (modify, delete, activate, or inactivate)? *

Mark only one oval.

Difficult

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Very Easy

10. 8. Were you aware of the feature that allows you to redeem rewards using your donation points? *

Mark only one oval.

⬭ Yes

⬭ No

⬭ Maybe

11. 9. If yes to the above question, how straightforward was the redemption process? *

Mark only one oval.

1 ◯
2 ◯
3 ◯
4 ◯
5 ◯

12. 10. As a seller, were the order management tools intuitive and easy to use? *

Mark only one oval.

◯ Yes
◯ Somewhat
◯ No

13. 11. Did you encounter any technical glitches or bugs while using the app? *

Mark only one oval.

◯ Yes
◯ No
◯ Maybe

14. 12. Any additional feedback or suggestions to improve the app? *

You have completed the user testing survey. Please click the submit button

Thanks for your responses

Hope you have a nice day.😊

Weekly Report

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T2, Y3	**Study week no.: 3**
Student Name & ID: Wong Teng Wei, 19ACB03288	
Supervisor: Dr Suthashini a/p Subramaniam	
Project Title: Online Clothes Selling and Donation Management System	

1. WORK DONE [Please write the details of the work done in the last fortnight.] - Done the charity list display, charity organization detail screen, Donation request form, and donation request status screen. - Done testing on the features above.
2. WORK TO BE DONE Donation tracking feature by implementing Google Map Direction API
3. PROBLEMS ENCOUNTERED -None
4. SELF EVALUATION OF THE PROGRESS Improving the skills of using Firebase Real-time database and Firebase Storage.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T2, Y3	**Study week no.: 5**
Student Name & ID: Wong Teng Wei, 19ACB03288	
Supervisor: Dr Suthashini a/p Subramaniam	
Project Title: Online Clothes Selling and Donation Management System	

1. WORK DONE [Please write the details of the work done in the last fortnight.] - Done Donation tracking, enhanced Profile screen, reward list display, add reward and sponsor (admin operation).
2. WORK TO BE DONE Let user to redeem reward by display the reward's qr code once user click on Redeem button. Implement qr code scanner for claiming the reward.
3. PROBLEMS ENCOUNTERED **-** Real time Location of delivery driver has some delay displayed on google map.
4. SELF EVALUATION OF THE PROGRESS Know how to use google map direction api to track device current location and implement real time tracking.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T2, Y3	**Study week no.: 7**
Student Name & ID: Wong Teng Wei, 19ACB03288	
Supervisor: Dr Suthashini a/p Subramaniam	
Project Title: Online Clothes Selling and Donation Management System	

1. WORK DONE [Please write the details of the work done in the last fortnight.] - Have done the Reward QR code generator, Reward QR code scanner, Past donation records list, Order Management module.
2. WORK TO BE DONE **-**Develop a rating system for user to rate their past donation.
3. PROBLEMS ENCOUNTERED **-** None
4. SELF EVALUATION OF THE PROGRESS Learned how to generate qrcode contains specific information and use device camera to scan qrcode to change value in database.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T2, Y3	**Study week no.: 9**
Student Name & ID: Wong Teng Wei, 19ACB03288	
Supervisor: Dr Suthashini a/p Subramaniam	
Project Title: Online Clothes Selling and Donation Management System	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

- Have done the Product Management module, Purchases Record list, Donation Request Management module (charity side)

2. WORK TO BE DONE

- do all the testing
- write report

3. PROBLEMS ENCOUNTERED

- None

4. SELF EVALUATION OF THE PROGRESS

- Learned how to handle the process of managing orders (seller side) and purchases (buyer side).

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T2, Y3	**Study week no.:** 11
Student Name & ID: Wong Teng Wei, 19ACB03288	
Supervisor: Dr Suthashini a/p Subramaniam	
Project Title: Online Clothes Selling and Donation Management System	

1. WORK DONE [Please write the details of the work done in the last fortnight.] - Have done the Chapter 6 (black box testing, user testing, objective evaluation)
2. WORK TO BE DONE - left Chapter 5 System Implementation and Chapter 7 Conclusion
3. PROBLEMS ENCOUNTERED - None
4. SELF EVALUATION OF THE PROGRESS Managed to do black box testing and user testing, and document it in correct way.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T2, Y3	**Study week no.: 13**
Student Name & ID: Wong Teng Wei, 19ACB03288	
Supervisor: Dr Suthashini a/p Subramaniam	
Project Title: Online Clothes Selling and Donation Management System	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

- Have done the Chapter 5 (Hardware setup, Software setup, Setting and Configuration, System Operation with Screenshot, Implementation Issues and Challenges) and Chapter 7 (Project Review, Limitations, and Future Enhancement)

2. WORK TO BE DONE

- Format checking
- Ensure all the required contents are documented before submit.

3. PROBLEMS ENCOUNTERED

- None

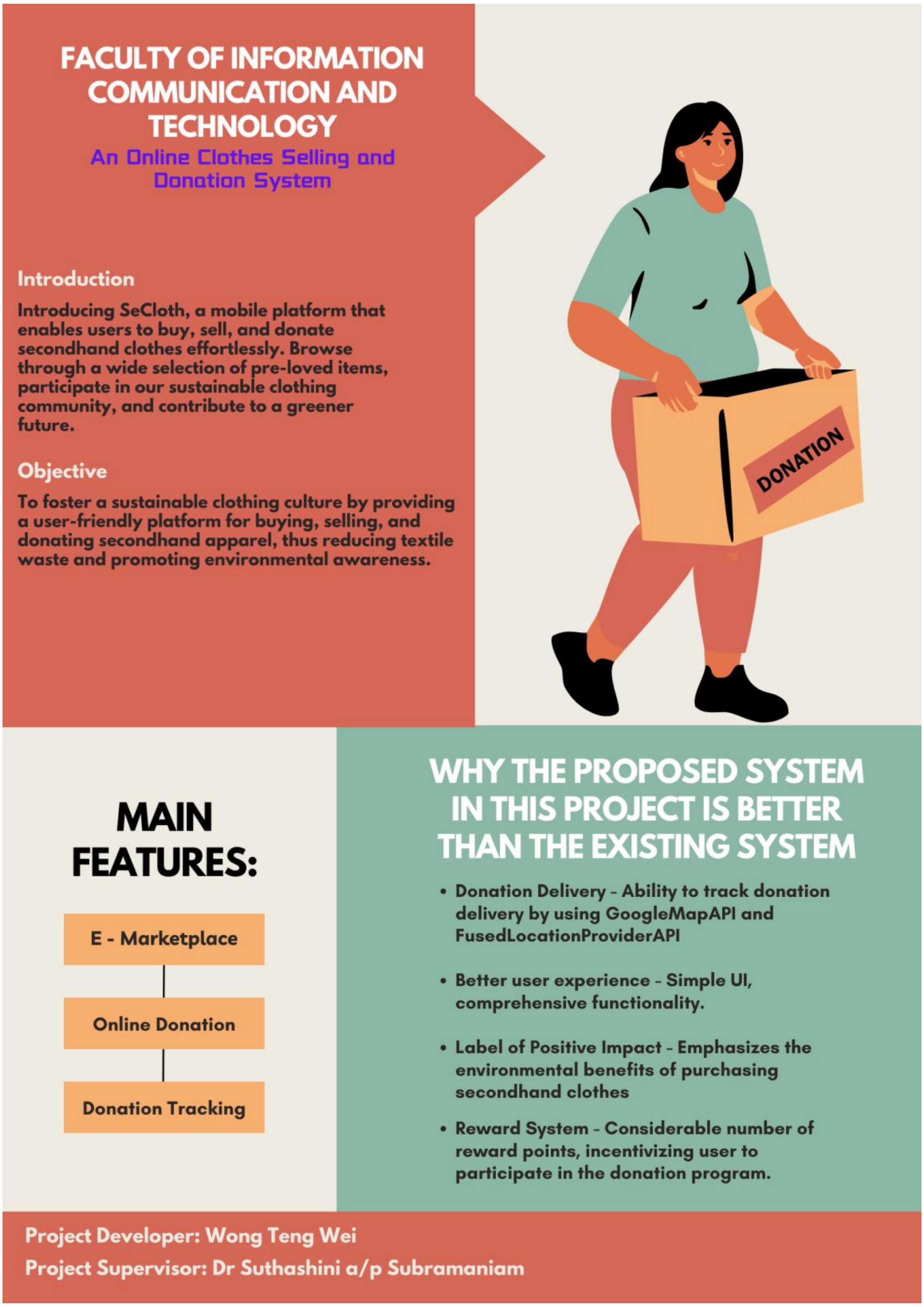
4. SELF EVALUATION OF THE PROGRESS

- Managed to detail the system's technicalities, tackle its challenges, and envision its future potential in a cohesive manner.

Supervisor’s signature

Student’s signature

POSTER


FACULTY OF INFORMATION COMMUNICATION AND TECHNOLOGY
An Online Clothes Selling and Donation System
Introduction
Introducing SeCloth, a mobile platform that enables users to buy, sell, and donate secondhand clothes effortlessly. Browse through a wide selection of pre-loved items, participate in our sustainable clothing community, and contribute to a greener future.
Objective
To foster a sustainable clothing culture by providing a user-friendly platform for buying, selling, and donating secondhand apparel, thus reducing textile waste and promoting environmental awareness.
DONATION
MAIN FEATURES:
E - Marketplace
Online Donation
Donation Tracking
WHY THE PROPOSED SYSTEM IN THIS PROJECT IS BETTER THAN THE EXISTING SYSTEM
• Donation Delivery - Ability to track donation delivery by using GoogleMapAPI and FusedLocationProviderAPI
• Better user experience - Simple UI, comprehensive functionality.
• Label of Positive Impact - Emphasizes the environmental benefits of purchasing secondhand clothes
• Reward System - Considerable number of reward points, incentivizing user to participate in the donation program.
Project Developer: Wong Teng Wei
Project Supervisor: Dr Suthashini a/p Subramaniam

PLAGIARISM CHECK RESULT

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