*Chapter in Book*

# myPLANET Application: An Innovative Recycling System

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***Abstract:*** *Recycling is the process of collecting waste materials and breaking them down into building blocks of new products. Efficient waste management via recycling is essential to protect the environment and the health of human population. However, the community is still unaware of recycling, and they lack confidence and awareness in recycling, thus leading to the disposal of recyclable wastes. Therefore, a recycling tracking application called myPLANET was developed to encourage public to recycle their waste thus reducing the waste dumping in oceans and landfills. We also want to develop myPLANET application using Android Studio which consists of Kotlin, XML and Google's Firebase, and guide users on how to recycle using the futuristic features in myPLANET app. Modern problems require modern solutions. Aside from Google's Firebase, which will be used for user authentication, data storage, and artificial intelligence, we also used XML, which defines properties and the layout of objects in the app. Moreover, this application utilized APIs (Application Programming Interfaces) that allows applications to communicate with each other, and Kotlin, which is the framework, to create the myPLANET application using Android Studio. As a result, a mapping system was deployed in the application which would guide the users on the location of recycling centers. Besides that, guidelines and FAQ page, a reward system, and recycling programs were also administered to make the objectives of our application come true. Based on the conducted survey, 100% of participants agreed that the app states its purposes and function, and encouraged them to recycle. This app will be a steppingstone of Malaysia's goal in becoming a country with net zero carbon emissions by 2050.*

*Keywords: keyword1; myPLANET application; recycling process; tracking system.*



## 1. INTRODUCTION

Our solution for a better environmental sustainability in the world is a Recycling Tracking Application, named "myPLANET". myPLANET will encourage people to participate in the noble act of recycling. We are confident in our application's ability to be able to help the community to recycle effectively. The innovative features that our app offers would not only be able to bolster the rate of recycling, but in the long run, make an impact on global warming. myPLANET offers the user a neat and user-friendly UI, and a way to get rewards for their efforts.

When compared to other countries, the recycling rate of Malaysia is estimated at 31.52% in 2021 which is relatively low (BERNAMA, 2022). Lack of confidence, awareness, motivation, knowledge, and information lead to the decreases of the rate of recycling in Malaysia. 1 in 2 adults say that their recycling behaviours are affected by whether the items actually get recycled or just gets dumped to the landfill. While every 4 out 5 adults who do not recycle say that they would recycle more if they had more guidance and facilities (Wood, 2021). Lack of information on what happens to recyclables after collection negatively impacts the public. Users do not know whether their items are actually recycled or thrown away into landfills. In addition to lack of certainty, consumers also expressed a great lack of confidence in the recycling system, with only one-third of the community believing that only a quarter of what they put in their recycling bins is actually recycled. Due to the lack of knowledge on the recycling system, users commonly send contamination along with their recyclables. This would cause thousands of tons of valuable recycling to be diverted to the landfill, not by the user, but by the recycling plant. The current recycling system is not transparent. Lack of confidence, awareness, motivation, knowledge, and information all comes into play when it comes to the low recycling rates.

The goals of our project are to reduce the waste dumping in oceans and landfills and recycle these wastes into beneficial new products. We also want to develop myPLANET application using Android Studio which consists of JAVA, XML and SQLite, and to guide users on how to recycle and build confidence using the futuristic features in myPLANET.

myPLANET has the potential to be commercialized through the green points reward system. Collaboration with various industries also allows discount coupons to users as their rewards for effective recycling. We will also collaborate with the community and businesses to host recycling and environmental programs which would provide a place for business marketing fulfilling their corporate social responsibility.

We are confident that this app will be a steppingstone towards achieving net zero carbon emissions by 2050. myPLANET will collaborate with companies, organizations, and governments to make this goal realistic. People will be more aware of what they consume and how it impacts the environment. This project will create new job opportunities that will lead to economic growth. Cities and communities around the globe will be more sustainable as carbon emissions will be greatly reduced because recycling will be more prevalent due to the impact of myPLANET. These goals are in accordance with the United Nation's 17 Sustainable Development Goals.

## 2. METHOD & MATERIAL

Here are the steps to use myPLANET app for recycling. First, we would sort the recyclables according to the guidelines provided and drop them off at the nearest recycling center which can be seen at the mapping section of the myPLANET app. Then, the workers at the recycling center scan QR code, and we would instantaneously get green points according to the amount and type of recyclables. We could keep track of the progress that our recyclables have gone through, and view the end product. We could see how much greenhouse gases have been saved from being emitted, and how many resources from being used.

### *2.1. Development of myPLANET's User Interface*

To develop an app, first, you need to design the layout. In Android Studio, the layout is designed using a type of file called XML, which stands for Extensible Markup Language. It is used to define the position and the characteristics of objects in the app, like images, buttons, and text fields.

XML is used to change the color and behavior of buttons, for example, to give the UI a more aesthetic feel.

### *2.2. Development of myPLANET's Framework*

The next step is to add the functionalities of the app, using Kotlin, which will be the framework of our app. The framework is used to put the functionalities into our app. For example, if we wanted an app to go to another page when a button is pressed, or if we were to connect a database to our app, Kotlin will be used. For each activity created, which is a page in Android studio, there will be a Kotlin activity file and XML layout file for us to customize the look and functionalities of the page.

SDK will also be used to develop myPLANET. SDK is a set of software tools and programs used by developers to create applications for specific platforms. SDK tools include a wide range of things, including libraries, documentation, code, samples, processes, and guides which developers can use and integrate into their own apps.

### *2.3. Development of myPLANET's Back-End*

API, also known as Application Programming Interface, is usually packaged into an SDK. API is a software intermediary that allows two applications to talk to each other. In our project, APIs are used to display the map near the user, to generate unique QR code for each user every time they recycle, to collaborate with other.

Firebase is a set of hosting services for any type of application. It offers NoSQL and real-time hosting of databases, content, social authentication, and notifications, or services, such as a real-time communication server. Google's Firebase will be used for user authentication, storage of data and artificial intelligence for recommendation of recycling location and redemption of green points.apps to redeem green points and to connect to social media.

To develop the myPLANET application using Android Studio, we used Kotlin, which is the framework, XML, which defines properties and the layout of objects in the app, SDKs (Software Development Kits) which are sets of software tools and programs used to create applications, APIs (Application Programming Interface) which allows to applications to talk to each other, and Google's Firebase, which will be used for user authentication, storage of data and artificial intelligence for recommendation of recycling location and redemption of green points.

In the future, we will implement fresh new features based on the feedbacks, criticism, and new ideas that we have and receive so that our app will truly be the best version to be commercialized in the near future. By improving our application, we hope to attract more new users and improve the user's experience while using the app. We are also planning to apply for a government grant because even a non-profit organization uses money, and building and maintaining an app is no cheap thing. Cloud-based services like Google's Firebase are not free and we plan to use government grants to cover just that. We also hope to attract investors to help support the ever-growing myPLANET community. With the current progress in development, we are looking forward to an alpha release by 2023.

## 3. FINDINGS

### *3.1 myPLANET Application Survey*

We conducted a survey on teenagers aged 13-18 to gain insides into their recycling habits. Another survey was also conducted on selected participants, they were given a prototype of our application and were asked to give feedback and opinions.

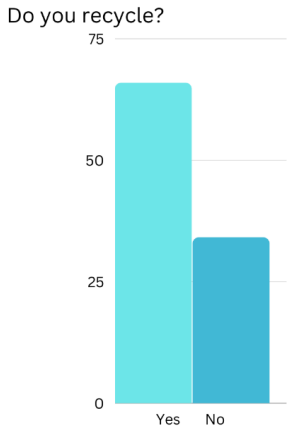


**Figure 1**. Percentage of respondents who do recycle.


**Figure 2.** The percentage of respondents who feel motivated if being rewarded after recycle.

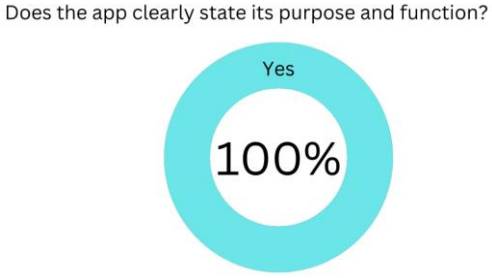


**Figure 3.** The percentage of respondents who agree that the app clearly state its purpose and function.

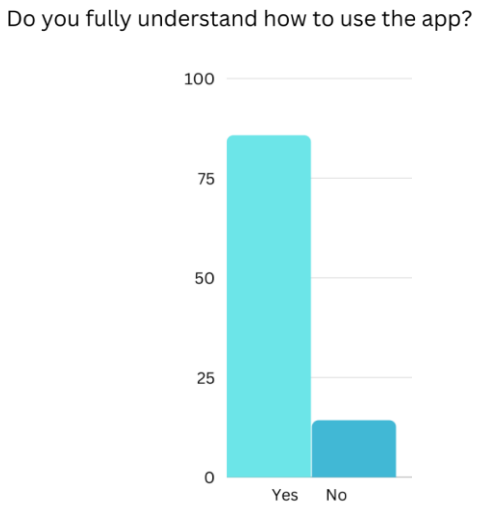


**Figure 4.** The percentage of respondents who fully understand on how to use the app.

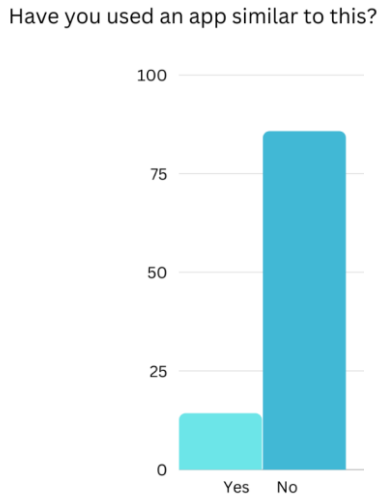


**Figure 5.** The percentage of respondents who have used an app similar to this.

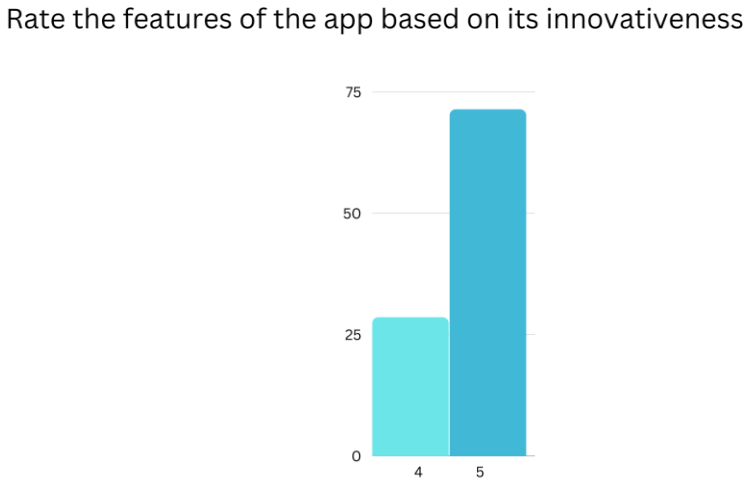


**Figure 6.** The percentage of respondents who rate 4 & 5 of the app based on its innovativeness.

### *3.2. myPLANET Application's User Interface*

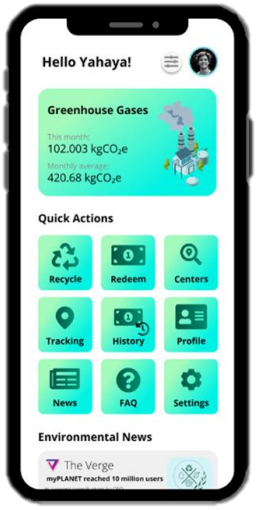


**Figure 7.** myPLANET Application Home Page.


**Figure 8.** myPLANET Application Recycling Selection Page.


**Figure 9.** myPLANET Application Recycling History Page.

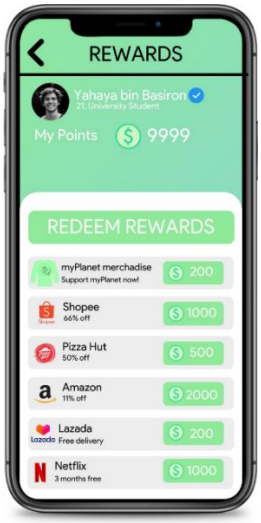


**Figure 10.** myPLANET Application Redeem Rewards Page.


**Figure 11.** myPLANET Application Recycling Result Page.

## 4. DISCUSSION

We learned that the recycling rate that was received was quite positive, with 65.9% of participants saying that they do recycle. (Fig.1). All the participants agreed that they will recycle more if given more guidance and facilities. 95.1% of them also stated that they will be more motivated to recycle if given rewards (Fig.2). From the feedback on the app, the participants all 100% agreed that the app states its purposes and function, the app's UI is neat and clear, and the app will make people interested in recycling. (Fig.3). While 85.7% of the participants fully understand how to use the app and stated that they have never used an app like ours (Fig. 4 & 5). All participants also rated the innovativeness of the features of the app high or very high (Fig. 6). From the survey that we have done, we are confident that our app is able to increase the rate of recycling, through the fact that our app will provide guidance and rewards to those that wish to recycle. Our app will also teach them how to recycle properly.

Our main idea for our project is a recycling application with 6 main features that would work together in order to bring you the best recycling experience. myPLANET has a tracking system that will enable users to keep track of the stages that their recyclables have gone through, and ultimately view what was made from their recyclables. The features that we have implemented makes myPLANET stand out among other recycling applications. Moreover, users will also be rewarded with green points, which they can later exchange for discounts and vouchers on e-commerce platforms (Fig. 10). We have also prepared a guidelines and FAQ page which will answer questions the user may have about recycling. To make our guidelines more interesting and attractive to the young generation, we will collaborate with celebrities and social media influencers to feature them in our guidelines videos. We are also making it easier for the public to recycle by implementing a mapping system that will assist users where and when to recycle. Users can read updates and news about environmental programs near the user through myPLANET. We also allow users to share their recycling results on social media, which will attract more users to recycle through myPLANET. These features implemented in our app prove that myPLANET is not just only an app, but a whole new recycling infrastructure.

## 5. CONCLUSION

In conclusion, myPLANET app is a convenient and easy-to-use application for all users. The innovative features included in the app would revolutionize the act of recycling, making the process easier as a whole and attracting more people to it. myPLANET is an essential tool in achieving the goal of zero net carbon emissions by 2050. The application can be accessed via the link below.

Closed Testing Access Application: https://bit.ly/TEST-myPLANET

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