MOBILE SAVINGS APPLICATION WITH GAMIFICATION (MSAG)

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MOBILE SAVING APPLICATION WITH GAMIFICATION

(MSAG)

GAN KAR HOU

Thesis submitted in fulfillment of the requirements

for the award of the degree of

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ABSTRAK

Mobile Savings Application with Gamification ialah aplikasi yang boleh melakukan lebih daripada sekadar membolehkan anda menyemak transaksi harian, baki dan menambah pendapatan atau perbelanjaan harian. Mereka juga boleh membantu anda menyimpan dan mengurus kewangan anda dengan cara yang lebih menarik. Contohnya, menawarkan ganjaran, pencapaian. Objektif projek ini adalah untuk mengkaji teknik gamifikasi untuk menggalakkan pengguna menggunakan aplikasi penjimatan mudah alih dengan gamifikasi. Dalam aplikasi ini, Model Waterfall telah digunakan sebagai metodologi untuk pembangunan aplikasi. Model Air Terjun mempunyai 6 fasa iaitu keperluan, analisis, reka bentuk, pengekodan, pengujian dan pelaksanaan. Pelan ujian yang akan digunakan dalam projek ini ialah Ujian Penerimaan Pengguna (UAT) dan Ujian Kefungsian (FAT). Outputnya adalah umum kerana ia adalah aplikasi mudah alih yang digunakan awam.

ABSTRACT

Mobile Savings Application with Gamification is an application that can do more than just enable you to check daily transaction, balances, and adding daily income or expenses. They can also help you save and manage your finances with a more attractive way. For example, offering rewards, achievement. The objectives of this project are to study on gamification technique to encourage user using mobile saving application with gamification. In this application, the Waterfall Model has been used as a methodology for application development. Waterfall Model has 6 phases which are requirements, analysis, design, coding, testing and implementation. The testing plan that would use in this project is User Acceptance Testing (UAT) and Functionality Testing (FAT). The outputs are public since it is a public used mobile application.

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Chapter 1 : Introduction

1.1 Background

Savings enable for not just income growth and consumption increases, but also for consumption smoothing in the face of numerous uncertainties. Individual and family savings decisions are one of the most important predictors of national savings. These decision-makers split the present increase in their resources between consumption, current needs satisfaction, and savings, which will affect their capacity to satisfy future desires. Patrick Kanyi Wamuyu (2016) claims that the task of balancing immediate family needs with long-term financial goals is usually a difficult task, which in most cases leaves the families with minimal or no savings. When available, these minimal savings are then stored using rudimentary methods such as giving them to a relative for safe keeping or hiding them somewhere in the house.

Economists and social scientists commonly define saving as the amount of money left over after expenses are removed, but Katona (1975) claims that this is not what the average person considers to be saving. Savings, in the eyes of the typical person, refers to money placed in bank accounts or other assets in order to protect oneself from future insecurity or to acquire goods and services. Katona (1975) outlined three types of saving behaviours in the general population. First, contractual saving, which is forced or mandatory saving in which one pays regular instalment payments for an item such as a home mortgage. Second, discretionary saving, where one deliberately saves, and third residual saving, where one does not spend all of income and therefore saves by default.

Childhood experiences including one's parents' money management style, the chance to participate in explicit financial duties, and the influence of socialisation mediators all have an impact on one's money nature. There are two types of purchasing behaviour that have emerged. First, a comparison of student and random samples shows that students reported being part in the generally held set of deviants buying habits in far larger numbers than non-students. It is also said that more than twice as many students as non-students testified that they buy when they do not need anything, that they shop for enjoyment, and that they buy unplanned products. Similarly, a

substantially higher proportion of students than non-students say they can't resist sales, that they buy things they don't have enough money for, that they are concerned with spending, that they hide things they buy from their families, and that their spending habits cause havoc.

Money saving apps can do more than just enable you to make mobile payments, deposit checks, and monitor your savings and checking account balances. They can also help you save and manage your finances. For example, offering rewards, cash back or coupons and discounts. Several mobile apps offer rewards or cash incentives based on user shopping behaviour. Besides, mostly of the mobile saving applications include budget planner which can easily add and update the categories so that user can track their spending by seeing where the money comes and goes. Patrick Kanyi Wamuyu (2016) claims that the platform could be used by families to pay for the things that need to be paid for, control their spending, have something for savings, and achieve household financial security.

To sum up, the mobile saving application can be used by user to be more concerned about the important of having saving in the early time to increase their awareness of saving as one of the most important parts of accumulating wealth and ensuring a solid financial future is saving money. Make good use of mobile saving application gives you a route out of life's uncertainty and allows you to live a more fulfilling life.

1.2 Problem Statement

Technology is a powerful tool that can support and bring transformation or revolution on the current available mobile saving applications, from making it encourage user on saving to increase their awareness in daily saving. Due to lack of current implementation toward saving planning using mobile application with more effective and attractive ways, many people lack of motivation of having saving in their daily life. Current digital application did not encourage user to have saving with simple and effective ways for example record daily expenses, budget planning and more. So, revolution on the current mobile saving application is a must, to increase user awareness

and adding more attractive way to encourage community join the road of saving together.

1.3 Objectives

The objectives of this project are as the following:

    i.   To study on gamification technique to encourage user using mobile saving application with gamification.

    ii.   To design and develop a new mobile saving application with gamification.

    iii.   To test and validate mobile saving application with gamification.

1.4 Scope

The scope of this project is as following:

    i.   The target users of this application are user with age 20-60 because this category of user have basic income and commitment or expenses and can think maturely.

    ii.   The application is only Android-based.

    iii.   The area that covers of this application is not for investment but only saving and budget planner.

    iv.   This application is in the English Language.

1.5 Significance of Project

The significance of this project is as following:

    i.   Give benefit to family financial planning or personal financial planning.

    ii.   Improve the functionality of the available mobile saving application.

1.6 Report Organization

The organization of this report is as follows:

Chapter 1 discuss the background, problem statement, objectives, scope and significance of this project.

Chapter 2 provides some related literature review of the application, listing the existing system, comparison of existing systems, and so on

Chapter 3 presented the methodology used in the project.

Chapter 4 summarize the planning of the project.

Chapter 5 provides the conclusion from the whole project.

2.1 Introduction

This chapter is to introduce the details of the existing system or mobile application that are related to this project. Three existing applications will be chosen as research. This literature review will illustrate the description, advantages, disadvantages, and the comparison of the existing application based on their features, functions, and platform, and so on.

2.2 Existing Systems

Afterwards, this part will explain and analyse in more details the existing applications, and also list out the advantages and disadvantages that need to be discussed for improving in the future application. These three existing applications are BUDGT – Daily Finance, YNAB (You Need A Budget) and Digit.

2.2.1 BUDGT – Daily Finance

BUDGT gives user every single day as user could track their expenses. By keeping with daily budget, users are guaranteed to have something left by the end of the month. BUDGT will help user keep track of their Expenses in a very simple way and tell user how much money they could can spend each day, taking in account what user have already spent during the current month. This application can be used at anytime and anywhere as its 100% offline without usage of internet and does not send any personal data to anyone else. Users can track their spending by simply entering daily expenses, BUDGT will take care with all the calculation behind it, and users can see every day how much they could spend. Besides, this application can create a monthly budget for users to have a better view on their daily, monthly or yearly saving. Users just need to define their monthly income and fixed cost; everything will be complete by BUDGT.

The first advantage of BUDGT is high security level. Internal and third-party risks can be reduced by using an application with a high security level. It can also protect the user's data and increase customer trust. High security can protect critical data from leaks while also keeping the company's name out of the news. Next, the second advantage is it have built-in reminders. This means that users will receive push notification with their usage of daily expenses and available budget any time of the day. The first disadvantage is this application not compatible for others type of mobile operating system users except iOS users. As we know, there are a lot of people are using Android and Huawei Gallery, and this disadvantage will bring a huge difficulty to those who are not using iOS users.
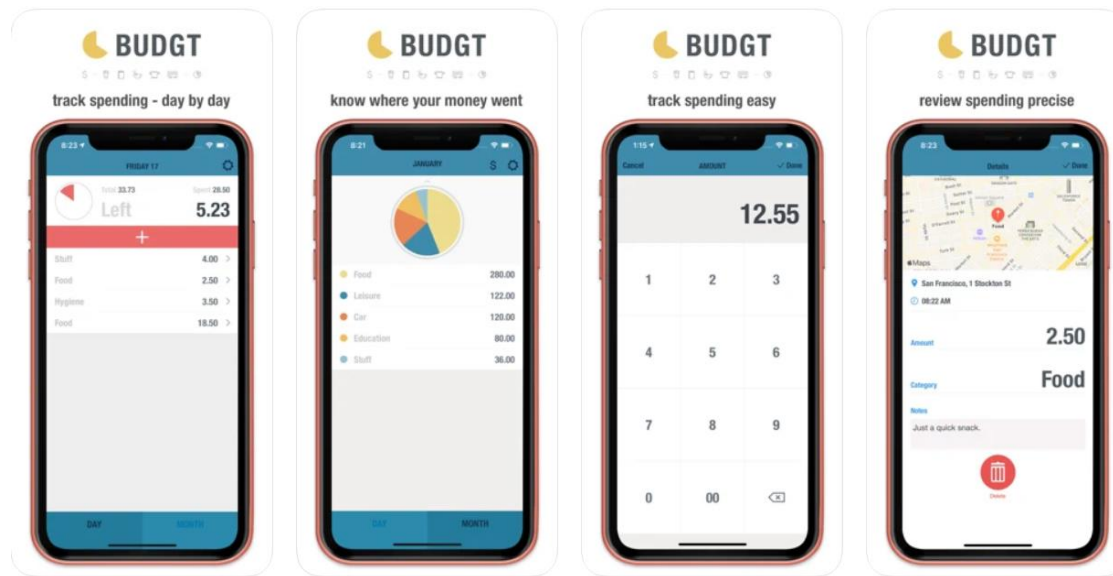
Figure 2.1: Interface of BUDGT

2.2.2 YNAB (You Need A Budget)

The YNAB was developed to fulfil the demand for easy and quick organised saving ways for the user that required. Budgeting is approached in a proactive manner with YNAB. The app's users take an active role in creating goals, adding spending, and revising their budgets as necessary. You can start with the default budget categories, but you can also construct your own to suit your needs. The YNAB includes variant useful features such as goal tracking, loan calculator, spending and net worth reports and real-time sync. By using goal tracking, users can establish and track various

financial objectives at the same time. These can be short-term objectives, such as saving for a security deposit on a new apartment, or longer-term objectives, such as a foreign trip or a down payment on a home. Besides, the spending and net worth reports features, with a wide range of data tools at their disposal, consumers can make sense of their personal or joint accounts. More significantly, these financial reporting tools provide users an accurate view of how that picture changes over time, giving users insights that could help shore up their finances or just double down on techniques that are already working.

The first advantage of this application is joint budgeting capabilities. YNAB allows couples, families, and cohabitants to budget together, including roommates who pool cash to pay common expenses like rent and utilities. This is good news for millions of potential customers whose financial life aren't completely untethered, and are frequently missing from free budgeting tools. Next, the second advantage is YNAB able to use on a wide range of mobile devices. YNAB offers a wide range of mobile-friendly and hands-free apps for various device types, including iOS and Android smartphones, tablets, Apple Watch, and even Alexa-compatible smart speakers. It's an omnichannel budgeting solution in the truest sense. The first disadvantage of this application is costly. YNAB reverts to a paid 85 dollar per year subscription plan after the free trial period expires. There's no way to avoid paying for YNAB except through the referral programme, which is limited by the number of qualifying referrals in your network.

Figure 2.2: Interface of YNAB

2.2.3 Digit

Digit aims to assist users in achieving their short- and long-term financial objectives. Each day, the app analyses the user's linked bank account using machine learning, gaining access to their spending habits and balance. The system then takes money that the user may safely save and deposits it in the Digit account that the user specifies either the Digit savings or retirement account. At any moment, funds from Digit accounts can be transferred back to a user-linked account. In addition to setting savings objectives, users can identify debts such as student loans or credit card debt that they want to pay off, ensuring that their budget is well-founded.

The first advantage of this application is Digit offers multiple savings goals. The Digit app will automatically begin saving for a rainy-day fund. At any time, you can choose to add a new savings goal. Digit will recommend a few common objectives, such as saving for a rainy-day fund, travelling, or purchasing gifts. You can make your own aim if none of the ideas fit. Any savings goal can be given a dollar sum and a deadline or left open-ended. Savings are usually split evenly among all of your goals. There are, however, ways to change this. If you've established a goal amount and a deadline, Digit will set aside the necessary funds to meet the deadline. There's also a boost option for prioritising specific objectives. It's worth noting that you can't enhance goals with an end date because the savings rate is determined by the finish date. Next, the first disadvantage is potential risk on self-credential information. When user open a Digit account, the app collects personal information from the user such as name, email address, mobile phone number, banking information, age, gender, location, address, birthday, Social Security number, citizenship information, occupation status, and where the income is coming from. The app also collects information about user transactions, from third parties that might spend money with, and other information via cookies. This might lead to leak of self-credential information to others third-party, no one can ensure that our information could be well protected.
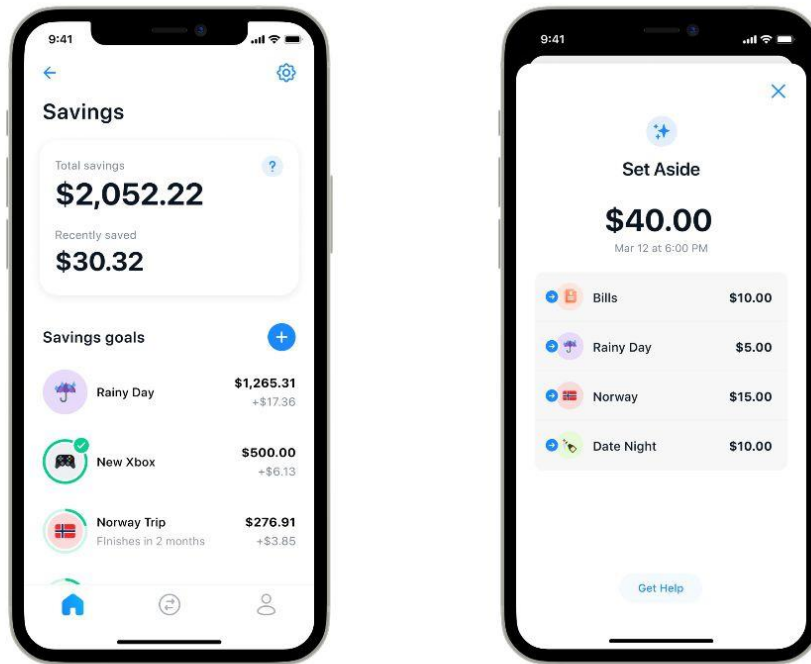
Figure 2.3: Interface of Digit

2.3 Comparison of Existing Systems

In this part, the comparison of the previous mobile apps is summarized in Table 2.1. Furthermore, their advantages and disadvantages are summarized in Table 2.2.

Specification	BUDGT – Daily Finance	YNAB (You Need A Budget)	Digit
User	Everyone	Everyone	Everyone
Category	Finance	Finance	Finance
Hardware	Smartphones	Smartphones, Tablet, Laptop, PC	Smartphones, Tablet
Type of Technology	Audio, Camera	Audio, Camera	Audio, Camera

Platform	iOS	iOS, Android	iOS, Android
Features	- BUDGT will help user keep track of their Expenses in a very simple way and tell user how much money they could can spend each day, taking in account what user have already spent during the current month. - This application can be used at anytime and anywhere as its 100% offline without usage of internet and does not send any personal data to anyone else. - Users can track their spending by simply entering daily expenses, BUDGT will take care with all the calculation behind it, and users can see every day	- By using goal tracking, users can establish and track various financial objectives at the same time. These can be short-term objectives, such as saving for a security deposit on a new apartment, or longer-term objectives, such as a foreign trip or a down payment on a home. - The spending and net worth reports features, with a wide range of data tools at their disposal, consumers can make sense of their personal or joint accounts.	- For bill budgeting, users may skip the spreadsheets and let Digit do the work for them. When it's time to submit a payment, Digit calculates the appropriate amounts to gradually budget into a dedicated Bills account. - This programme contains a savings planner that allows the user to save money without even thinking about it. The user can set an endless number of savings objectives, and Digit will assist them in achieving them all.

	how much they could spend.		
	- This application can create a monthly budget for users to have a better view on their daily, monthly or yearly saving.		
Cost	Free	14.99 USD per month	9.99 USD per month

Table 2.1: The comparison of three existing systems

System	Advantages	Disadvantages
BUDGT – Daily Finance	The first advantage of BUDGT is high security level	The first disadvantage is this application not compatible for others type of mobile operating system users except iOS users
	The second advantage is it have built-in reminders	
YNAB (You Need A Budget)	The first advantage of this application is joint budgeting capabilities	The first disadvantage of this application is costly
	The second advantage is YNAB able to use on a	

	wide range of mobile devices	
Digit	The first advantage of this application is Digit offers multiple savings goals	The first disadvantage is potential risk on self-credential information

Table 2.2: Advantages and disadvantages of three existing systems

2.3.1 Gamification

Gamification is a strategy for improving systems, services, organisations, and activities by providing experiences similar to those found in video games in order to encourage and engage people. This is usually achieved by applying game design features and game concepts (dynamics and mechanics) to non-game situations. Gamification is a type of persuasive system design that uses game design elements to improve user engagement, organisational productivity, flow, learning, crowdsourcing, knowledge retention, employee recruitment and evaluation, ease of use, system usefulness, physical activity, traffic violations, voter apathy, public attitudes toward alternative energy, and other factors. The majority of studies on gamification suggest it has beneficial benefits on individuals, according to a compilation of gamification research. Individual and contextual variances do exist, though.

There are 3 ways to measure a gamification which is:

1. Adoption

    When a new application, program or feature is introduced, it is important to measure the adoption rate. This can be calculated by dividing the number of users currently using the gamification feature by the total number of users with the application. For example, this project gamification feature is introduced for saving purpose, it would be useful

to figure out how many users are logged in and using the gamification feature.

2. Engagement

A basic evaluation of actions before and after a gamification element is helpful in determining the amount of behavioural engagement. The points gained and the levels attained inside the system may be used to determine this.

3. Productivity

This measures how the gamification feature affects productivity and performance. For example, in the case of a gamification feature in our project, simple measures of the time spent to hit targeted saving, the number of reward or achievement hit is the great indicators of the gamification feature's success.

2.4 Summary

Three different mobile apps are discussed in this chapter. The characteristics of these three existing systems are nearly identical. The goal of these applications is to make life easier for schools, teachers, parents, and students. On the other hand, it has several drawbacks for users. Despite their drawbacks, these programmes offer a slew of benefits to users. As a result, we must make effective use of these applications.

Chapter 3 : METHODOLOGY

3.1 Introduction

In this chapter, methodology of the project will be exploring. The phases of the selected methodology will be explained. Besides, use case diagrams, context diagram, a storyboard, design prototype are also be provided. Furthermore, the hardware and software that used for this application development are explained. Next, the functional, non-functional requirement, constraints and limitations are also stated out. Lastly, the flowchart to illustrate how the application works and the Gantt Chart are also provided.

3.2 Project Management Framework

The Waterfall Model has been chosen as a methodology for this mobile application development. Waterfall model has 6 phases which are requirements, analysis, design, coding, testing and implementation.
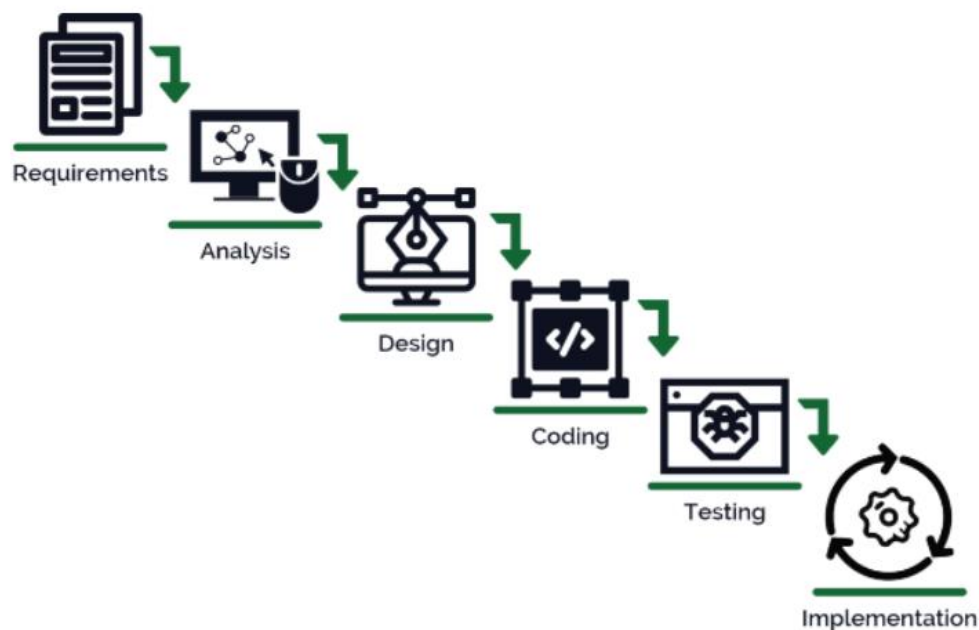

Figure 3.1: Waterfall Model of Software Development Life Cycle Phases (SDLC)

Each phase is crucial for the development process to become more methodical, so it will be thoroughly detailed in the next section. One of the early process models for software development was the Waterfall Model, also known as the Linear-Sequential Life-cycle Model. The downward mechanism of this model is comparable to that of a waterfall, as the name implies. The entire procedure is separated into phases, and it is critical to complete each one correctly before moving on to the next. The objectives, stages, and actions are all well defined in the Waterfall Model. As a consequence, planning, scheduling, allocating resources, and establishing objectives will be straightforward. Each phase has a deliverable, making the entire process easy to follow and understand. Furthermore, it is the preferred method for minor tasks.

3.2.1 Requirements Analysis

At this stage, all project requirements are analysed and documented in a specification document, and a feasibility study is undertaken to see whether they are feasible. Any limits or constraints that may impact the development process, such as time or money, must be considered. Most important to further grasp the requirements, have a brainstorming session and a walkthrough is required.

To get more information about the requirement, a survey session is required to be executed. This project is proposed for the development of Mobile Saving Application with Gamification. The target population is open for the public. There are 25 targets which consists of male and female from public to join in this survey session. To get the requirement needs for this application, they must answer 13 questions. The result of the survey and the question provided are shown in Figures below. Figure 3.2 shown the results of familiarity of Mobile Saving Application with Gamification.
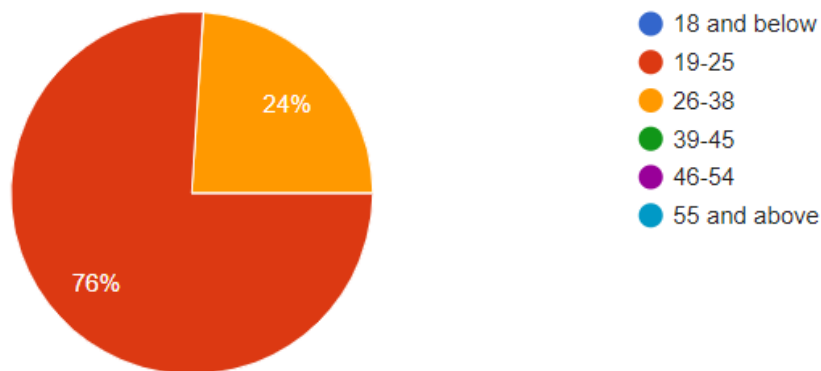
Figure 3.2: Result of age of peoples taking the survey

Refer to Figure 3.2, ages from 19-25 have 76% which is the highest among the others age follow by 26-38 with 24%.
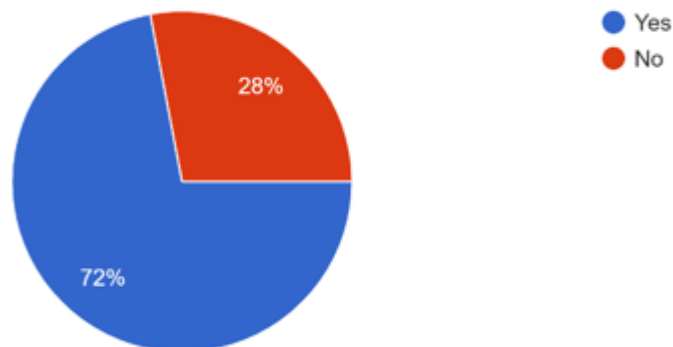

Figure 3.3: Result of familiarity of Mobile Saving Application with Gamification

Refer to Figure 3.3, it shows that percentage of those who heard the Mobile Saving Application with Gamification is higher than those who never heard the application before, which is 72% compared with 28%.
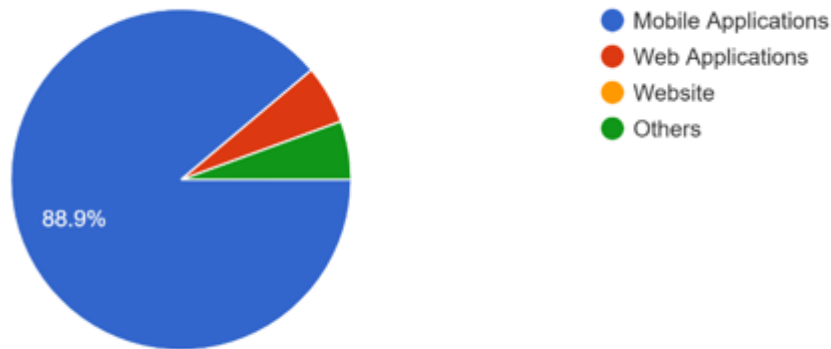
Figure 3.4: Result of type of platform that used

Refer to Figure 3.4, it shows that percentage of those who used the mobile application as platform is higher than web application platform, website platform and others platform, which is 88.9% compared with 5.6%, 5.6% and 0%.
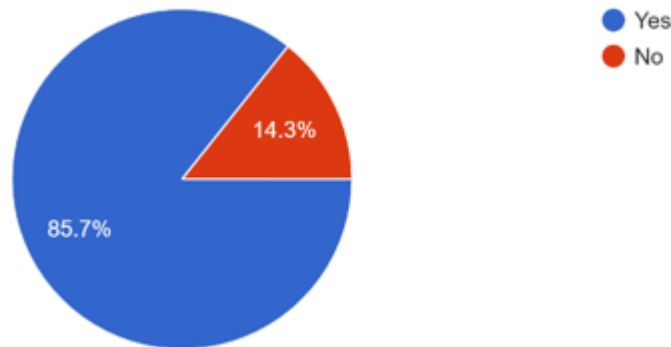
Figure 3.5: Result of expectation to use the application

Refer to Figure 3.5, it shows that percentage of those who expect to use the application to manage your daily budget is higher than those who does not expect to use, which is 85.7% compared with 14.3%.
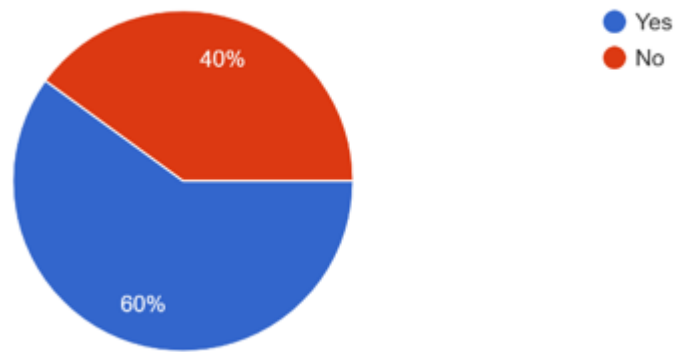
Figure 3.6: Result of experience using application to manage daily budget

Refer to Figure 3.6, it shows that percentage of those who have experience using application to manage daily budget is higher than those who does not have, which is 60% compared with 40%.
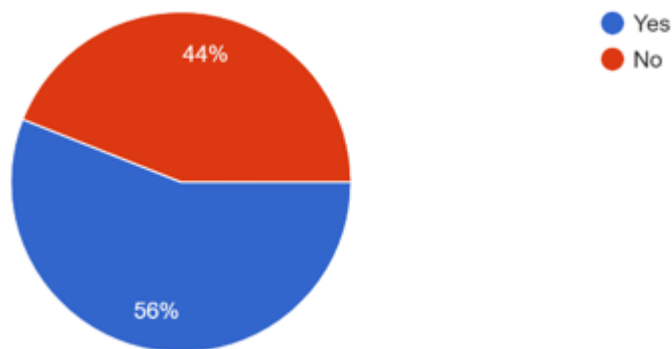
Figure 3.7: Result of record daily expenses everyday

Refer to Figure 3.7, 56% of peoples have record the daily expenses everyday while 44% of peoples does not have this habit of recording their daily expenses.
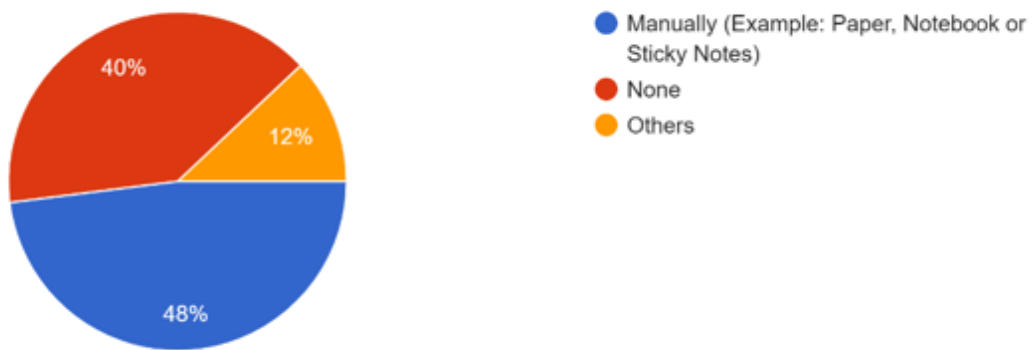
Figure 3.8: Result of method use to manage daily budget

Refer to Figure 3.8, 48% of peoples used manually method to manage their daily budget, 40% of people does not use any method while 12% of peoples used others method to manage their daily budget
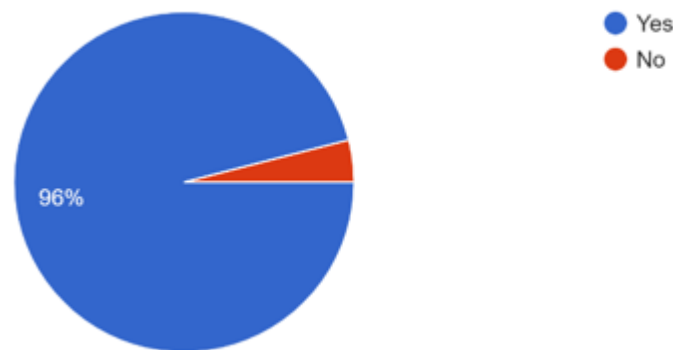
Figure 3.9: Result of necessary of the Mobile Saving Application with Gamification

Refer to Figure 3.9, it shows the necessity of this application is higher than non-necessary which is 96% compared with 4%.

Figure 3.10: Comments of necessary of the Mobile Saving Application with Gamification

Refer to Figure 3.10, it shows the Mobile Saving Application make easier to record the expenses on the spot and to have better money management.
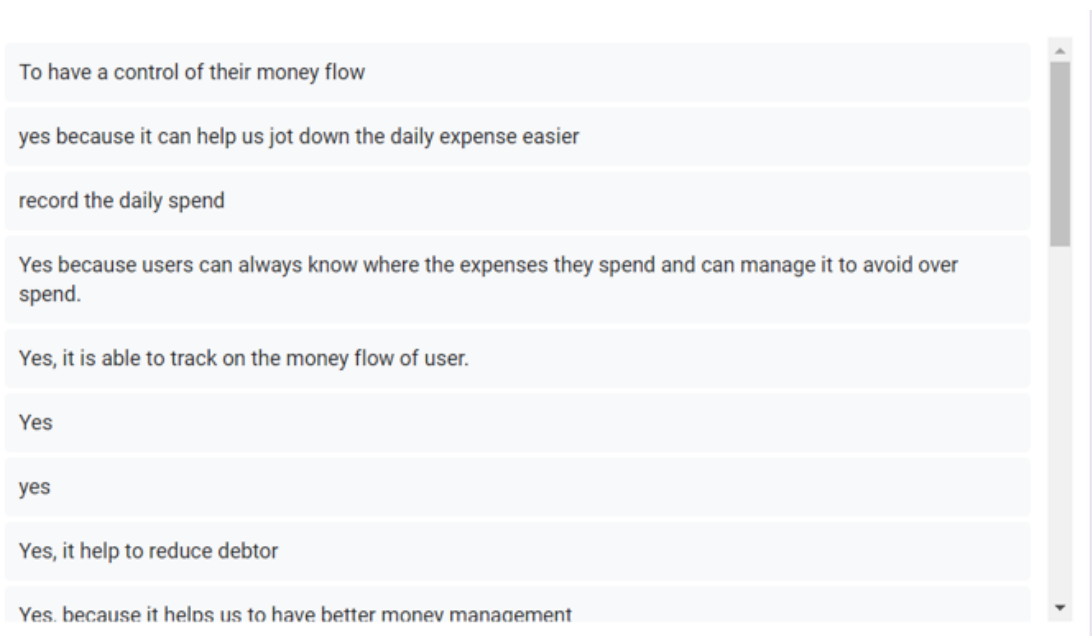
Figure 3.11: Results of the use of Mobile Saving Application with Gamification

Refer to Figure 3.11, it shows the Mobile Saving Application is very useful to the public as mostly could help them track on the money flow.
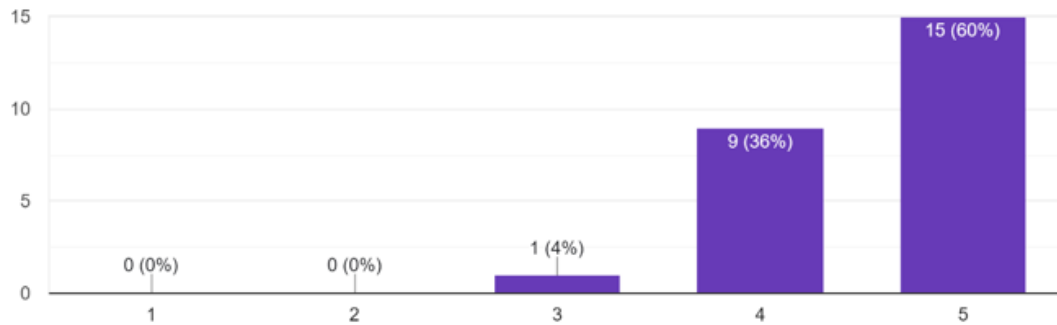
Figure 3.12: Degree of agreement of tracking budget everyday

Refer to Figure 3.12, 60% of people are mostly agree that it is important to keep track of the budget everyday follow by 36% of agree and 4% of neutral.
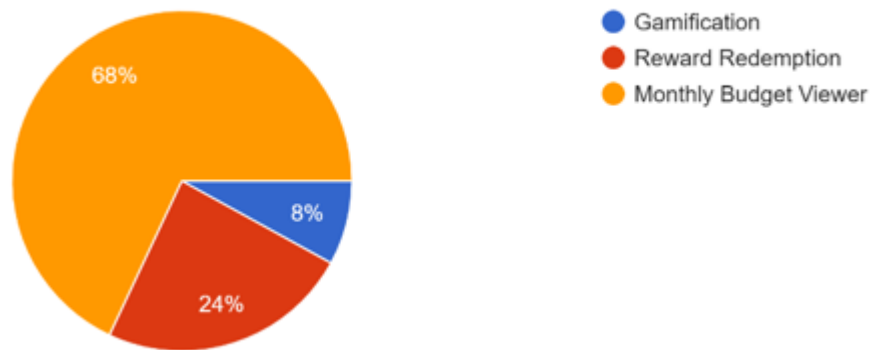
Figure 3.13: Result of the expectation function inside the Mobile Saving Application with Gamification

Refer to Figure 3.13, 68% of people thinks that Monthly Budget Viewer function should be inside the application while 24% choose Reward Redemption function and 8% choose the Gamification function.

Figure 3.14: Result of the suggested function expect inside the Mobile Saving Application with Gamification

Refer to Figure 3.14, it shows that some people suggest to a reminder and daily report or monthly report function into the application in future.

3.2.2 System Design

During this phase, the system design is established, which defines hardware and system requirements such as data layers, programming languages, network infrastructure, user interface, and so on. It helps define the overall system architecture, which is divided into two types of design phases:

a) **High-level design phase**

The process of system design and architecture starts here. It includes a module list with their functionalities, as well as module correlations, architectural diagrams, and database tables.

b) **Low-level design phase**

This requires the building of software components in the first place. The High-level Design from the previous step is broken down into several modules. The Low-level Design document describes each module (pseudo-code), allowing the programmer to code straight from the document. It also contains information

about the interface of each module, as well as error messages, dependency issues, and inputs and outputs.

3.2.3 Implementation

In this phase, the source code is written according to the requirements, as the name implies. Code is created from the physical design specifications. Individual programmes, known as units, make up the system, which are subsequently connected together. Each unit stands either a module or a design. Each unit's functionality is evaluated before it is incorporated, which is known as unit testing.

3.2.4 Testing

The code is then sent to the testing team, who will test the entire programme. Testers execute test cases manually or automatically to look for any potential weaknesses in the application. The client is also involved in the testing process to ensure that all criteria are satisfied. Any defects or issues detected during this process are addressed to achieve Quality Assurance.

3.2.5 Deployment

Following the completion of functional and non-functional testing, the programme is deployed into a live environment, which in this case is the client's server or a public platform, to be tested. After the programme has been deployed, end users can access it. In order to explain the system's benefits, this phase may also incorporate real-time user training.

3.2.6 Maintenance

Following the deployment phase, the next step is to provide the software or application support and maintenance to ensure that it functions smoothly. The major goal of this stage is to resolve any problems, faults, or bugs that the client and users encounter during use. Patches are published to address these vulnerabilities. In order to improve the product, newer versions need to be produced. All of this phase is to make the application become more better for user.

3.3 Project Requirement

In this section will describe all the requirements related to this mobile application. The requirements which is functional and non-functional requirement, constraint and limitations for this mobile application development project.

a) Functional Requirement
- Display the monthly budget value
- Display type of expenses
- Inserting amount of money for budget or expenses
- Display the achievement
- Display chart

b) Non-Functional Requirement
- Able to add 3 and more expenses per day
- Load monthly budget value within 15 seconds
- Load achievement within 20 seconds

c) Constraints and Limitations
- The application is only Android-based.
- This application is only in the English Language.
- The area that covers of this application is not for investment but only saving and budget planner.

3.3.1 Proposed Design
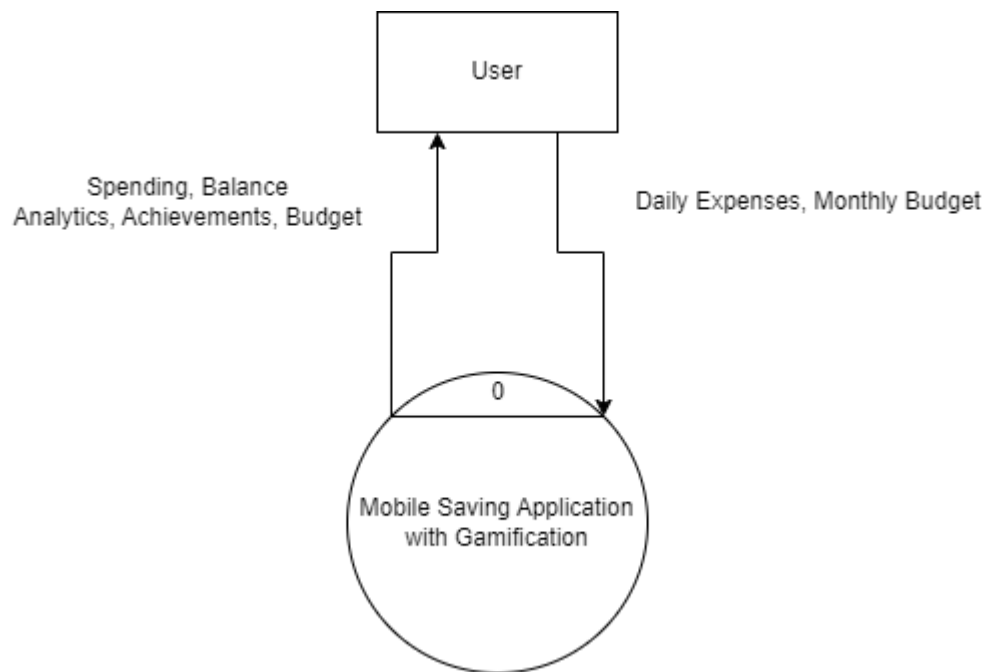
Figure 3.15: Context Diagram

Based on Figure 3.16, Use-Case Diagram for Mobile Saving Application with Gamification, user able to Sign Up for first-time user and Login for user that already have an account. Next, user can insert monthly income and daily expenses in the application by adding date, select category, adding amount and adding notes or description. After that, user can view transaction by selecting month and also transaction. Furthermore, user could also view balance by selecting which month, if user want to add income and expenses when they are viewing the balance, they can also add it in the view balance page. Besides, user could view their achievements and rewards. In view rewards page, user can select rewards that they want. Lastly, user can Logout from the application if they finish using the features.

Figure 3.16: Use-Case Diagram

Figure 3.17: Activity Diagram

3.4 Data Design
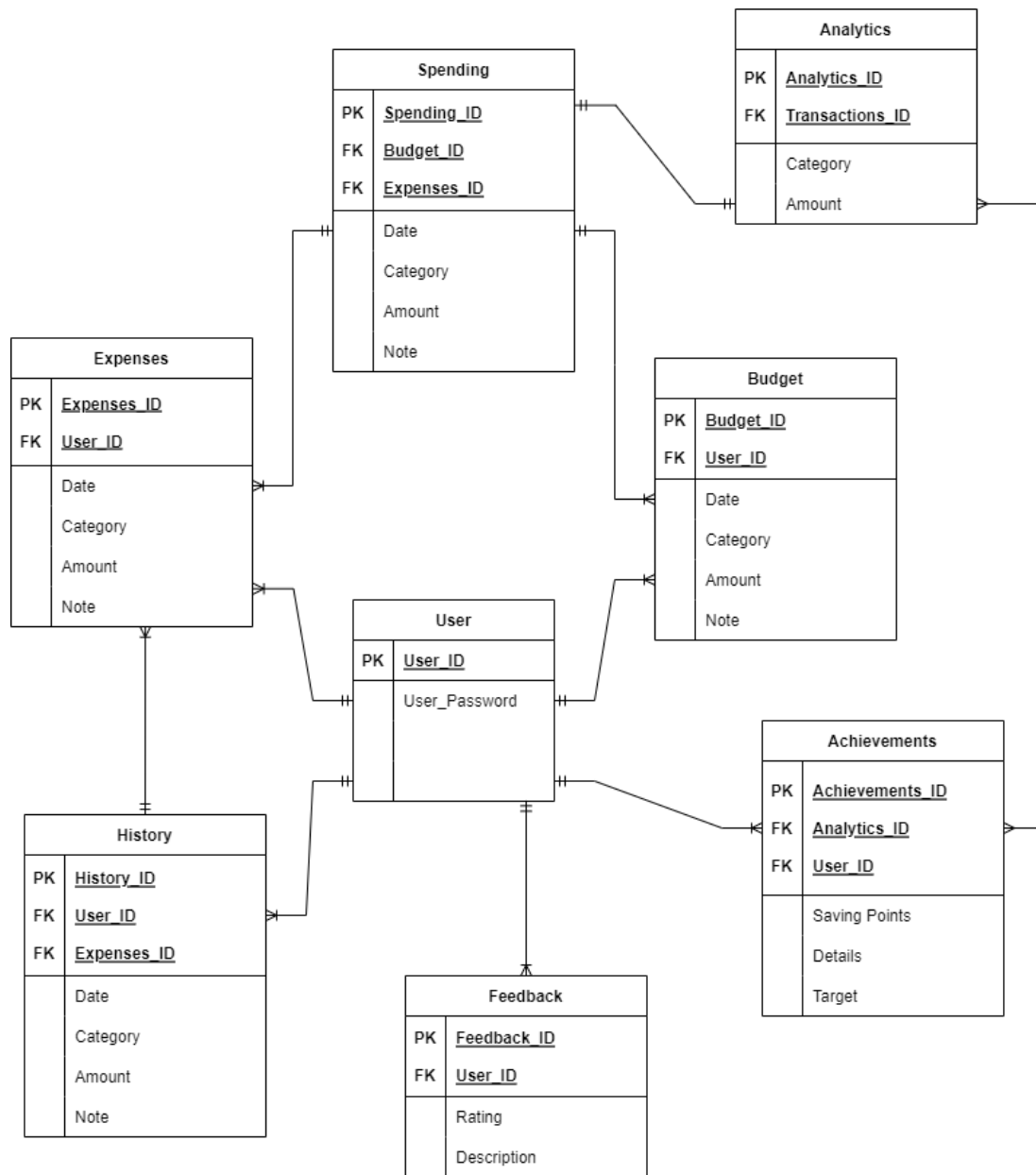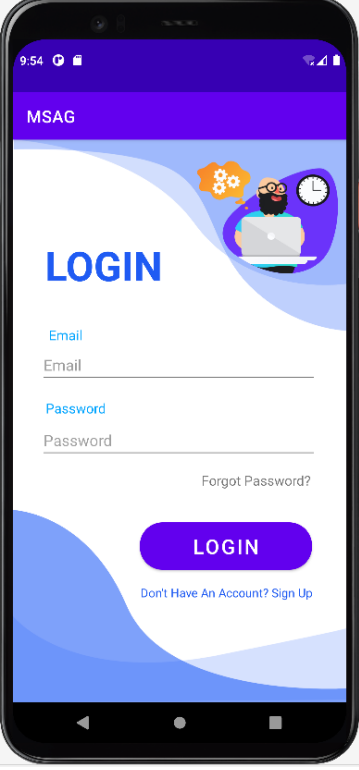
Figure 3.18: ERD Diagram

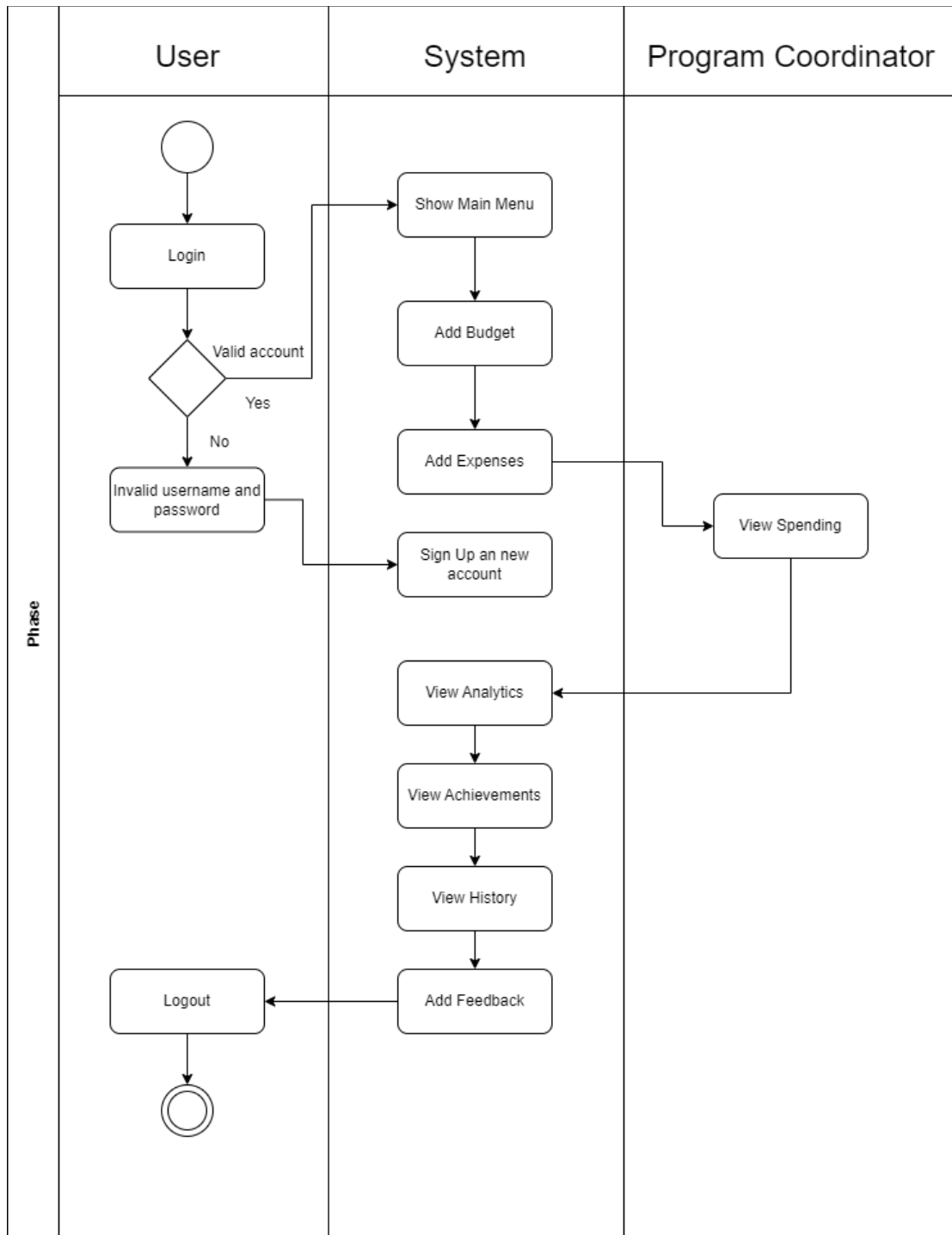| Field Name	Data Type	Field Length	Constraint	Description
User_ID	varchar	10	Primary Key, Foreign Key	User Login ID
User_Password	varchar	10		User Login Password
Budget_ID	varchar	10	Primary Key, Foreign Key	Budget ID
Budget _Date	Date			Date of Budget
Budget _Category	varchar			Category of Budget
Budget _Amount	number	10		Amount of Budget
Budget _Note	varchar	100		Note of Budget
Expenses_ID	varchar	10	Primary Key, Foreign Key	Expenses ID
Expenses _Date	Date			Date of Expenses
Expenses _Category	varchar			Category of Expenses
Expenses _Amount	number	10		Amount of Expenses
Expenses _Note	varchar	100		Note of Expenses
Spending_ID	varchar	10	Primary Key, Foreign Key	Spending ID
Spending _Date	Date			Date of Spending
Spending _Category	varchar			Category of Spending
Spending _Amount	number	10		Amount of Spending
Spending _Note	varchar	100		Note of Spending
Analytics_ID	varchar	10	Primary Key, Foreign Key	Analytics ID
Analytics _Amount	number	10		Amount of Analytics
Analytics _Category	varchar			Category of Analytics

Achievements_ID	varchar	10	Primary Key	Achievements ID
Achievements _Saving Points	number	10		Saving Points of Achievements
Achievements _Details	varchar	100		Details of Achievements
Achievements _Target	number	10		Required Target of Achievements
History_ID	varchar	10	Primary Key	History ID
History _Date	Date			Date of History
History _Category	varchar			Category of History
History _Amount	number	10		Amount of History
History _Note	varchar	100		Note of History
Feedback_ID	varchar		Primary Key	Feedback ID
Feedback_Rating	varchar	50		Rating of Feedback
Feedback_Description	varcahr	200		Description of Feedback

Table 3.1: Data Dictionary

3.5 Proof of Initial Project

FRAME 1	SCENE: Login Page

Descriptions	
Interface	2D
Texts	San-serif
Button	Login Button, Sign Up Button, Forget Password Button
Sound	Button Sound
Music	-
Previous Scene	-

Remarks

1. This is the login page for this application.
2. 3 buttons will be designed in this scene shown above.
3. The login button enables user to login.
4. The sign-up button enables user go to sign up page.
5. User could type their username and password in username and password text section.
6. Once the user forgot password, they can click on forgot password button to reset the password.

FRAME 2	SCENE: Sign Up Page
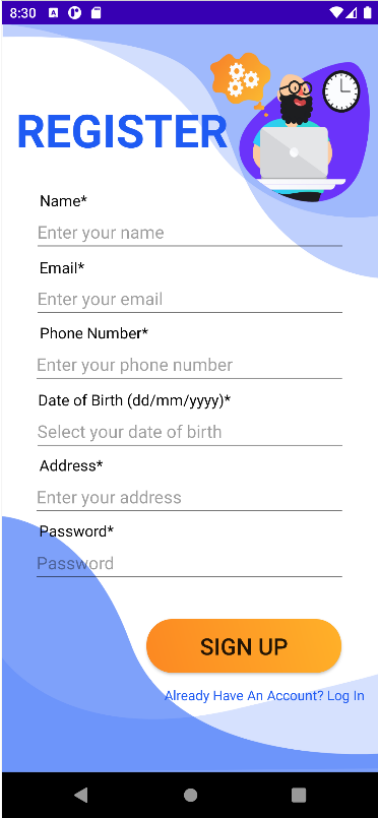
Descriptions	
Interface	2D
Texts	San-serif
Button	Login Button, Sign Up Button
Sound	Button Sound
Music	-
Previous Scene	Login Page

Remarks

1. This is the sign-up page for this application.

2. 2 buttons will be designed in this scene shown above.

3. The login button enables user go to login page.

4. The sign-up button enables user to sign up.

5. User could type their username and password in username and password text section.

FRAME 3	SCENE: Main Menu Page

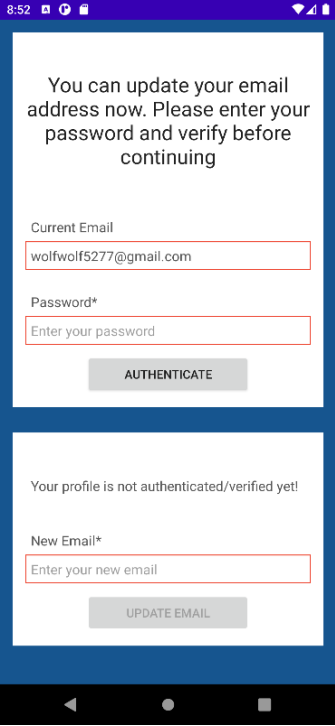| Descriptions	
Interface	2D
Texts	PangMenZhengDao, OPPO Sans
Button	User Profile Button, Update Profile Button, My Budget Button, Today Expenses Button, Weekly Expenses Button, Monthly Expense Button, Analytics Button, History Button, Achievement Button, Feedback Button, Logout Button.
Sound	Button Sound
Music	-
Previous Scene	Login Page

Remarks

1. This is the main menu page for this application.

2. 11 buttons will be designed in this scene shown above.

3. The User Profile Button enables user to go to User Profile page.

4. The Update Profile Button enables user to go to Update Profile page.

5. The My Budget Button enables user to go to My Budget page.

6. The Today Expenses Button enables user to go to Today Expenses page.

7. The Weekly Expenses Button enables user to go to Weekly Expenses page.

8. The Monthly Expense Button enables user to go to Monthly Expense page.

9. The Analytics Button enables user to go to Analytics page.

10. The History Button enables user to go to History page.

11. The Achievement Button enables user to go to Achievement page.

12. The Feedback Button enables user to go to Feedback page.

13. The Logout Button enables user to logout from the application and go back to Login page.

FRAME 4	SCENE: User Profile Page

Descriptions	

Interface	2D
Texts	PangMenZhengDao, Microsoft Yahei
Button	Back Button
Sound	Button Sound
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the user profile page for this application.

2. 1 button will be designed in this scene shown above.

3. The Back button allow user to go back to Main Menu page.

FRAME 5	SCENE: Upload Picture Page

Descriptions	
Interface	2D
Texts	PangMenZhengDao, Microsoft Yahei
Button	Choose Picture Button, Upload Button
Sound	Button Sound
Music	-
Previous Scene	User Profile Page

Remarks
1. This is the Upload Profile page for this application.
2. 2 buttons will be designed in this scene shown above.
3. The Choose Picture Button enables user to choose picture from their phone storage.
4. The Upload Button enables user to upload the picture they choose as profile picture.

FRAME 6	SCENE: Update Profile Page

Descriptions	
Interface	2D
Texts	PangMenZhengDao, Microsoft Yahei
Button	Back Button, Update Profile Pic Button, Update Email Button, Update Profile Button
Sound	Button Sound
Music	-
Previous Scene	Main Menu Page

Remarks
1. This is the Update Profile page for this application.
2. 4 buttons will be designed in this scene shown above.
3. The Back Button enables user to go back to the previous screen which is Main Menu page.
4. The Update Profile Pic Button enables user to update their new profile picture by uploading a new picture in Upload Picture page.

5. The Update Email Button enables user to go to Update Email page to update their old email.

6. The Update Profile Button enables user to update their profile after they have entered the new personal details.

FRAME 7	SCENE: Update Email Page

Descriptions	
Interface	2D
Texts	PangMenZhengDao, Microsoft Yahei
Button	Authenticate Button, Update Email Button
Sound	Button Sound
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the Update Email page for this application.
2. 2 buttons will be designed in this scene shown above.
3. The Authenticate Button enables user to authenticate their email with entering a correct password.
4. The Update Email Button enables user to update their new email address.

FRAME 8	SCENE: My Budget Page

Descriptions	
Interface	2D
Texts	PangMenZhengDao, Microsoft Yahei
Button	Add Budget Button
Sound	Button Sound
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the My Budget page for this application.
2. 1 button will be designed in this scene shown above.
3. The Add Budget Button enables user to add their monthly budget.

FRAME 9	SCENE: Today Expenses Page

Descriptions	
Interface	2D
Texts	PangMenZhengDao, Source Han Serif, Tahoma
Button	Add Expenses Button
Sound	Button Sound
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the Today Expenses page for this application.
2. 1 button will be designed in this scene shown above.
3. The Add Expenses Button enables user to add their daily expenses.

FRAME 10	**SCENE: Weekly Expenses Page**

Descriptions	
Interface	2D
Texts	PangMenZhengDao, Source Han Serif, Tahoma
Button	-
Sound	-
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the Weekly Expenses page for this application.

2. No button will be designed in this scene shown above.

3. This page enables user to know their weekly expenses.

FRAME 11	SCENE: Monthly Expenses Page
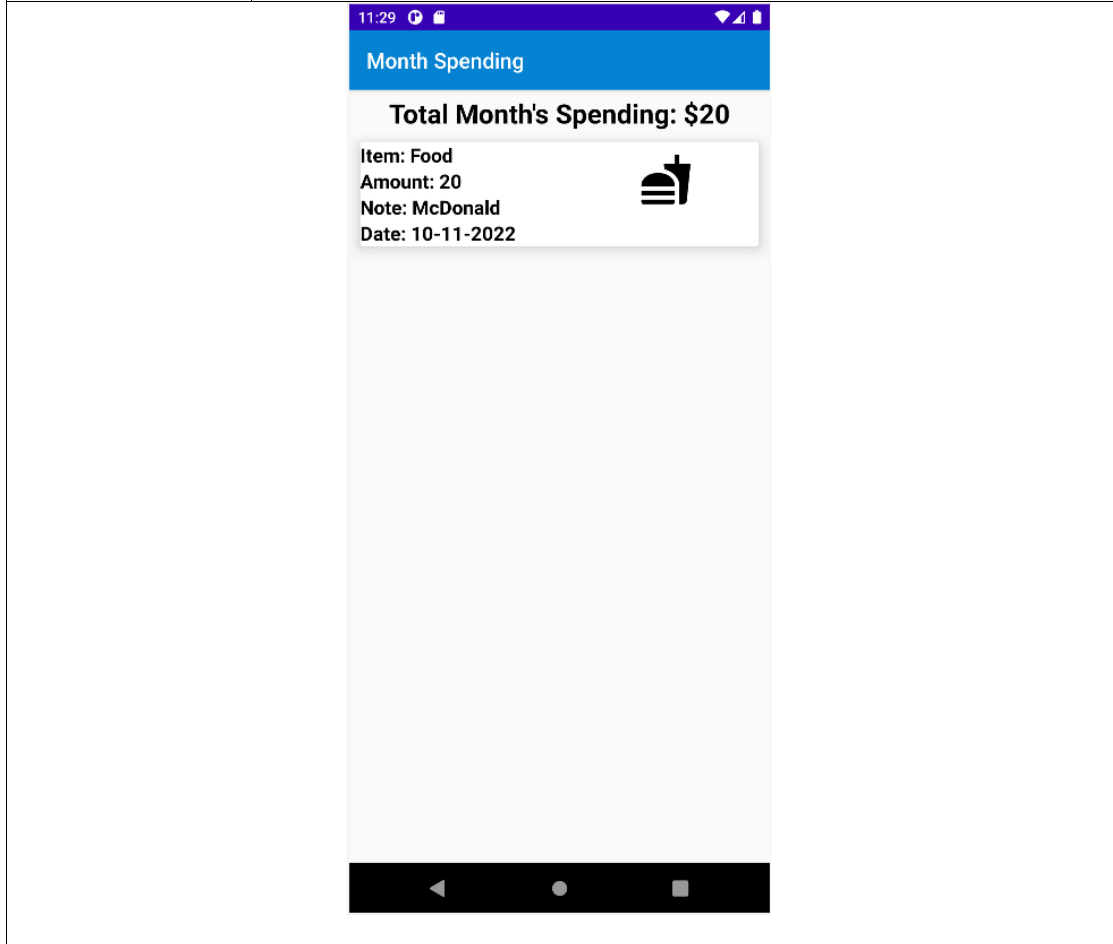
Descriptions	
Interface	2D
Texts	PangMenZhengDao, Source Han Serif, Tahoma
Button	-
Sound	-
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the Monthly Expenses page for this application.

2. No button will be designed in this scene shown above.

3. This page enables user to know their monthly expenses.

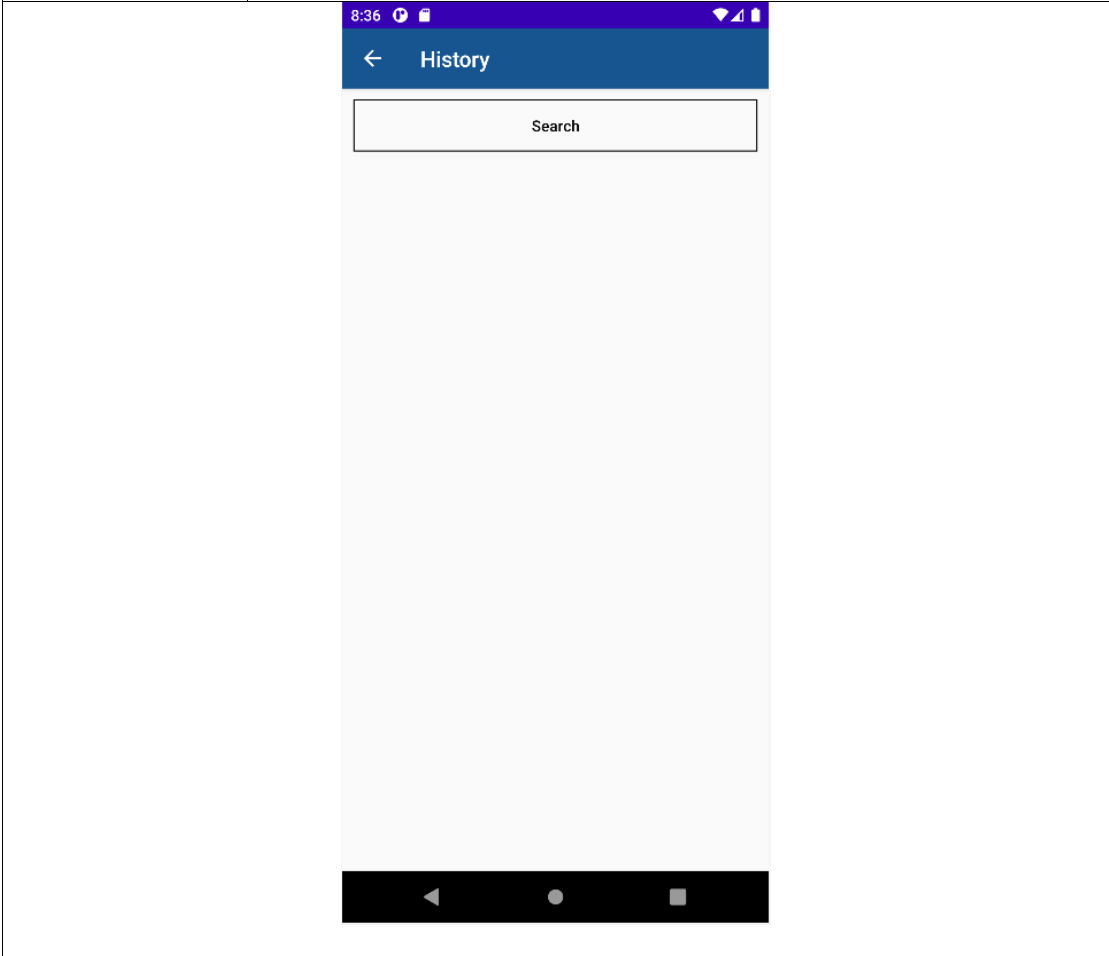| FRAME 12	SCENE: Analytics Page
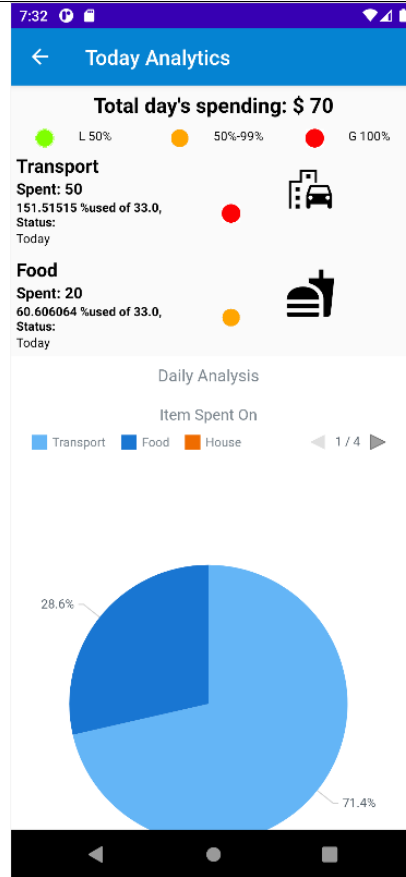
Descriptions	
Interface	2D
Texts	PangMenZhengDao, Source Han Serif, Tahoma
Button	-
Sound	-
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the Today Analytics page for this application.

2. No button will be designed in this scene shown above.

3. This page enables user to know their daily expenses analytics.

FRAME 13	SCENE: History Page

Descriptions	
Interface	2D
Texts	PangMenZhengDao, Source Han Serif, Tahoma
Button	Search Button
Sound	Button Sound
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the History page for this application.
2. 1 button will be designed in this scene shown above.
3. This Search Button enables user to search their daily expenses on the date they want to search for.

FRAME 14	SCENE: Achievement Page
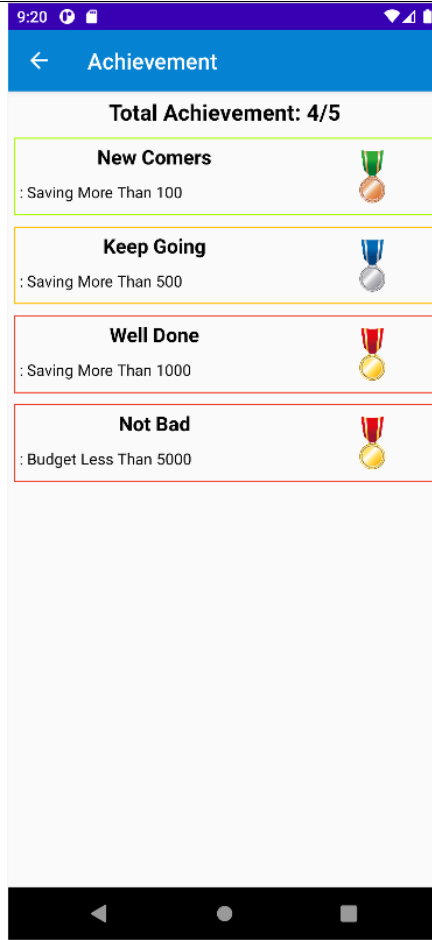
Descriptions	
Interface	2D
Texts	PangMenZhengDao, Source Han Serif, Tahoma
Button	-
Sound	-
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the Achievement page for this application.
2. No button will be designed in this scene shown above.
3. This page enables user to know which achievement that they have obtain by completing the target.

FRAME 15	SCENE: Feedback Page
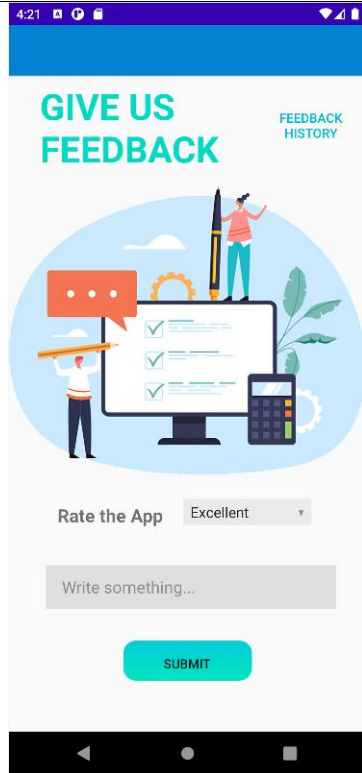
Descriptions	
Interface	2D
Texts	PangMenZhengDao, Source Han Serif, Tahoma
Button	Rating Radio Button, Text Button, Submit Button, Feedback History Button
Sound	Button Sound
Music	-
Previous Scene	Main Menu Page

Remarks

1. This is the Feedback page for this application.
2. 4 buttons will be designed in this scene shown above.
3. This Rating Radio Button enables user to choose the rating for this application.
4. This Text Button enables user to enter their comment/feedback toward this application.
5. This Submit Button enables user to submit the rating and feedback into the system.
6. This Feedback History Button enables user to check back the feedback that have did by the user previously.

3.6 Testing Plan

In this section will talk about testing plan. The testing plan that would use in this project is User Acceptance Testing (UAT) and Functionality Testing (FAT). First and foremost, to conduct UAT testing plan we need to define and write down the criteria we'll use to determine whether or not a piece of software is finished. This form of checklist is commonly referred to as "Definition of Done" (DoD), a term coined by scrum. It's critical for the team's success that everyone agrees on what "done" implies. Next, each feature we want to test should have its own set of requirements. These will most likely be collected in the form of user stories in modern software businesses. For these requirements, the exact objects and medium may differ. A whiteboard with post-it notes or a sophisticated project management application could be used. What matters is that we document the requirements for each of the application's intended functionalities.

Then, we need to create the test cases. We need write test cases for each feature based on the Definition of Done and the functionality requirements. In a nutshell, a test case is a series of stages, each with its own set of expected outcomes. Each test case focuses on a single application usage scenario. For example, "The apps are user friendly and easy to use", "The functionality of the apps is working well". It generally comprises of a sequence of tasks that the user or their representative can complete before determining if the application performed as expected. Besides, we can now perform the tests with the end-user or client. The amount of tester might be varied, from 10-100, depends on the size of the project itself. The tester will perform the prescribed activities for each of the test cases and report the results. If a fault is discovered by the user, it must be corrected as soon as possible. After that, the user repeats the test.

Lastly, when everything is operating well, the user, client, customer, or representative signs off, signalling that the application satisfies their requirements and is ready to use.

While for FAT, functional testing is a sort of testing that aims to determine if each application feature functions in accordance with the programme requirements. The result of each function is compared to the relevant requirement to see if it meets the end user's expectations. The testing is carried out by supplying sample inputs, recording the

resulting outputs, and ensuring that the actual outputs match the predicted outputs. For example, "Can users successfully log in to the application once they provide legitimate credentials?" and "Do inputs to the "Add New Record" screen successfully add and save a new record to the database?". We should have software with a unified user interface, a consistent API, and smooth integration with business processes at the completion of functional testing. There are some typical steps of conducting a Functional Testing (FAT) which is Identify the Testing Goals, Create Test Scenarios, Create Test Data, Design Test Cases, Execute the Test Cases and Deliberate On, Track and Resolve Defects. With all of this step only can conduct a quality testing.

3.7 Potential Use of Proposed Solution

In this section will talk about the potential use of proposed solution for this project. Users could use this application to manage their savings and also budget in long term or short term for their family. A better planning of their money in early stage could give user a better future for example can buy a house, accumulate funds for retirement, or purchase a vehicle. This might help users protect their future, enjoy the most that life has to offer, and live a more satisfying existence.

Next, users could use this application to plan short term goals. Savings aren't simply for the long haul. Users can also benefit from short-term savings. Many individuals save for a few months and then go on vacation. Besides, if users that have family and children, with the use of this application could give them a better secure. With a better planning it could provide for children's education, users may fund their children's goals and pay for the greatest schools and institutions in the world with a significant amount of funds and also it can give family security in case of an unfortunate event. Users may ensure that their family is well-provided for by saving in a disciplined manner. In the event of an emergency, users saving can provide a buffer for their loved ones, allowing them to overcome any financial difficulties.

Chapter 4 : RESULTS AND DISCUSSION

4.1 Introduction

With reference to the goals of the project, which were discussed in Chapter 1 of the report, the outcomes and discussion of the project are presented in this chapter. Screenshots from the working prototype that show the findings are used as examples. The results of each page or capability will be discussed in more detail and addressed throughout this chapter.

The Android Studio was used to construct the Mobile Savings Application with Gamification (MSAG). The focus of this mobile application is on spreading the awareness and importance of saving for all of the users. With the original features that provide in this mobile application, gamification was added to increase user's interest and favourability when using this application daily. User able to get achievement when they completed some pre-set target in this application.

4.2 System Design and Implementation

The user interface and features of the application will be covered in this section. This section also covers some of the most important code.

4.2.1 Login Page

Once the users initially start this application, the login page will show as the first scene of this application. They are 3 buttons where the users can click and will lead users to another page or have its own functionality, which is Forgot Password, Login and Sign-Up button. When Forgot Password button has been clicked, a dialog box will pop up where ask users to fill in their email address for getting the password reset link in their mailbox. While for Login and Sign-Up button, it will lead users to Login and Sign-Up pages. Besides, two text box available in this page which is for users to fill in their login credentials which is email and password to login their account. Figure 4.1 shows the Login Page and Figure 4.2 shows the Reset Password function.
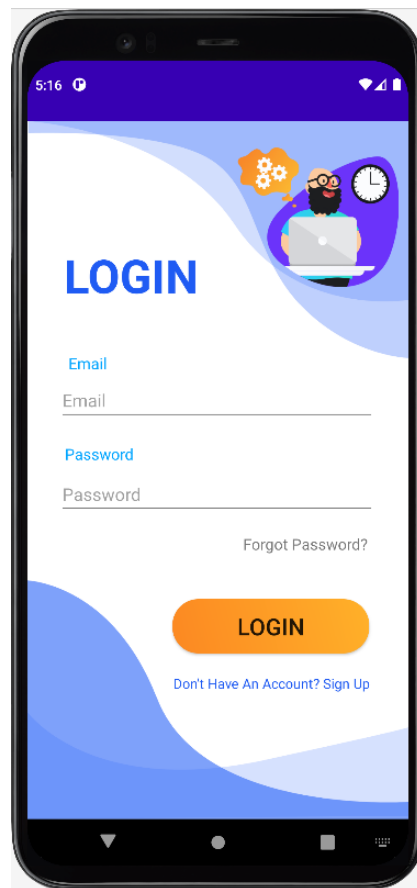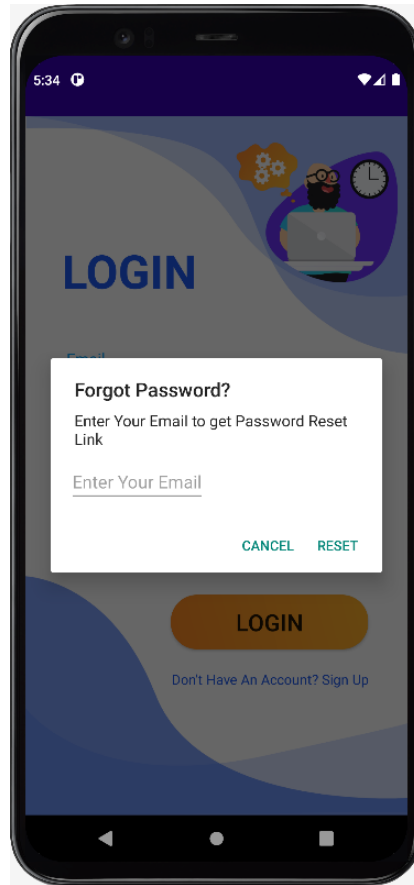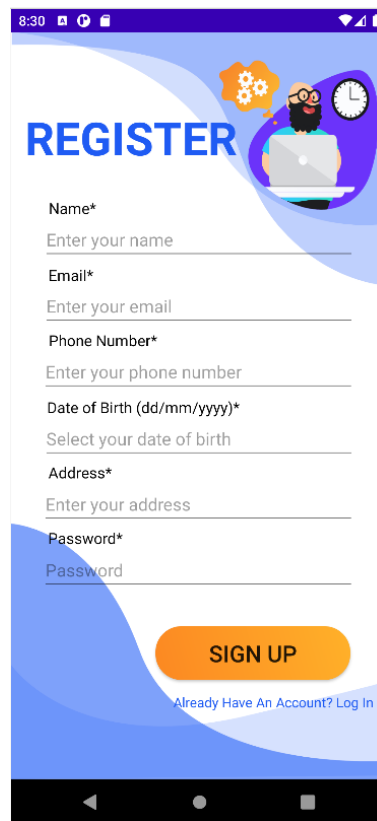

Figure 4.1: Login Page

Figure 4.2: Reset Password

```java
private void beginReset(String email) {
    firebaseAuth.sendPasswordResetEmail(email)
            .addOnCompleteListener(new OnCompleteListener<Void>() {
                @Override
                public void onComplete(@NonNull Task<Void> task) {
                    if (task.isSuccessful()) {
                        Toast.makeText( context: Login.this, text: "Check You Email to get Your Reset Link", Toast.LENGTH_LONG).show();
                    } else {
                        Toast.makeText( context: Login.this, text: "Failed...", Toast.LENGTH_SHORT).show();
                    }
                }
            }).addOnFailureListener(new OnFailureListener() {
        @Override
        public void onFailure(@NonNull Exception e) {
            // get and show proper error message
            Toast.makeText( context: Login.this, text: "" + e.getMessage(), Toast.LENGTH_SHORT).show();
        }
    });
}
```

Figure 4.3: Code for Forgot Password

4.2.2 Sign-Up Page

For first-time download this application, users can create a new account by entering an email address and a password at the textbox section. After complete entering the email and password, users can click Sign-Up button and the system will automatically create a new account for the user and jump back to the Login page for users to login with their new account. If users already register account for this application before this, there is a Login button for users to click and jump back to the Login page.

Figure 4.4: Code for Forgot Password

4.2.3 Main Menu Page

This page will appear after the users successfully login to their account with correct email addresses and password. There are 11 button available in this page, which is Create Profile, Edit Profile, My Budget, Today Expenses, Weekly Expenses, Monthly Expenses, Analytics, History, Achievement, Feedback and Logout Button. Each button will lead users to different page with different functionality. For first time user, after have login they can create a new profile by clicking the Create Profile button and they can edit it by clicking Edit Profile button. My Budget button will take the user to the My Budget Page. For Today Expenses, Weekly Expenses, Monthly Expenses button, it will take user to different period type of expenses page. Analytics button will take user to the Analytics Page which will show user the detail pie chart for daily expenses. History button will take user to the History Page which is for user to search the specific date for expenses. Achievement button will take user to the Achievement Page to view the achievements available. Lastly is the Feedback button which will take user to the Feedback Page for providing the feedback about the application.
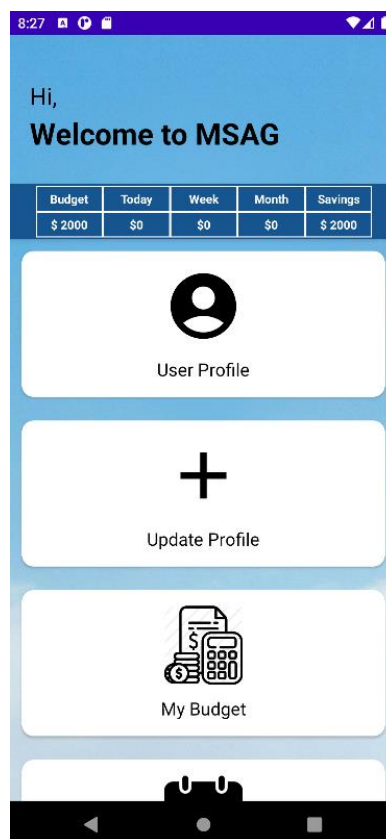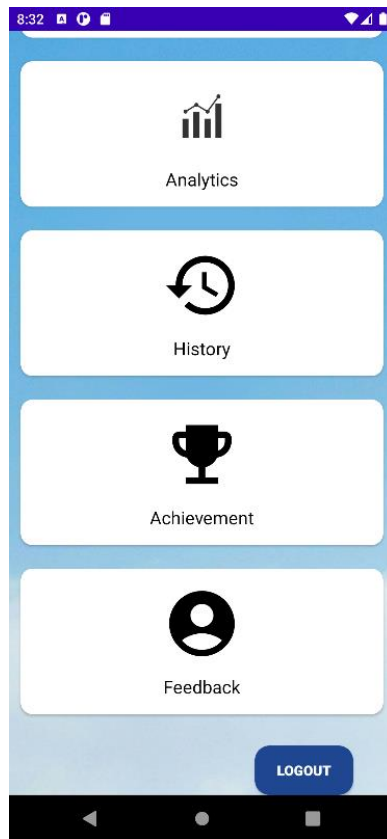

Figure 4.5: Main Menu Page 1

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Figure 4.6: Main Menu Page 2

4.2.4 User Profile Page

Users can view their profile in this page when they are login in this application. Users are able to upload their personal profile picture from phone into the User Profile page as their profile picture. When user click the Profile Picture Button it will lead user to a page for user to choose the picture they want to upload. Besides, in User Profile Page, Name, Phone Number, Email, Date of Birth and Address are able to view for this application.

Figure 4.7: User Profile
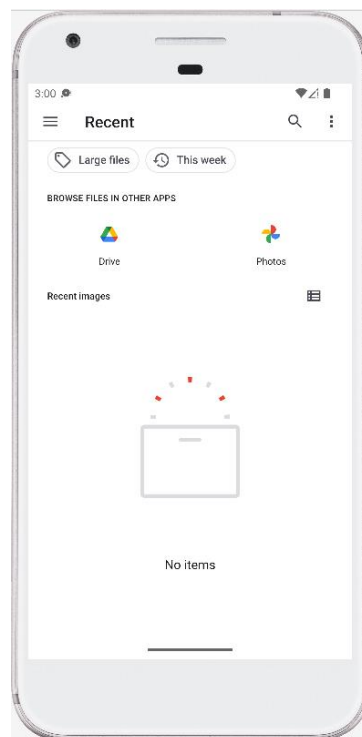
Figure 4.8: Upload Picture

Figure 4.9: Choose Picture

```java
private void uploadPicture(){
    final ProgressDialog pd = new ProgressDialog( context: this);
    pd.setTitle("Uploading Image...");
    pd.show();
    // Create a reference to "mountains.jpg"
    final String randomKey = UUID.randomUUID().toString();
    StorageReference mountainsRef = storageReference.child("images/" + randomKey);

    mountainsRef.putFile(imageUri) UploadTask
            .addOnSuccessListener(new OnSuccessListener<UploadTask.TaskSnapshot>() {
                @Override
                public void onSuccess(UploadTask.TaskSnapshot taskSnapshot) {
                    pd.dismiss();
                    Snackbar.make(findViewById(android.R.id.content),  text: "Image Uploaded", Snackbar.LENGTH_LONG).show();
                }
            }) StorageTask<UploadTask.TaskSnapshot>
            .addOnFailureListener(new OnFailureListener() {
                @Override
                public void onFailure(@NonNull Exception e) {
                    Toast.makeText(getApplicationContext(),  text: "Failed to Upload", Toast.LENGTH_LONG).show();

                }
            })
            .addOnProgressListener(new OnProgressListener<UploadTask.TaskSnapshot>() {
                @Override
                public void onProgress(@NonNull UploadTask.TaskSnapshot taskSnapshot) {
                    double progressPercent = (100.00 * taskSnapshot.getBytesTransferred() / taskSnapshot.getTotalByteCount() );
                    pd.setMessage("Progress : " + (int) progressPercent + "%");
                }
            });
}
```

Figure 4.10: Code for Upload Photo

4.2.5 Update Profile Page

Users able to edit the profile in this Update Profile Page if their personal information has changed or error. The available button were Update Profile Pic, Update Email and Update Profile. In this page have Edit Text box for user to edit their details which is textbox for Name, Phone Number, Date of Birth and Address. After user's finish typing all the new details, they need to click Update Profile Button to save these new details into the database server. Users can select update their profile picture or update their email by clicking the Update Profile Pic Button and Update Email Button, this will lead user to another page. After user has complete update either their profile picture, email or profile, the system will bring them back to the User Profile Page to view the new save profile details.
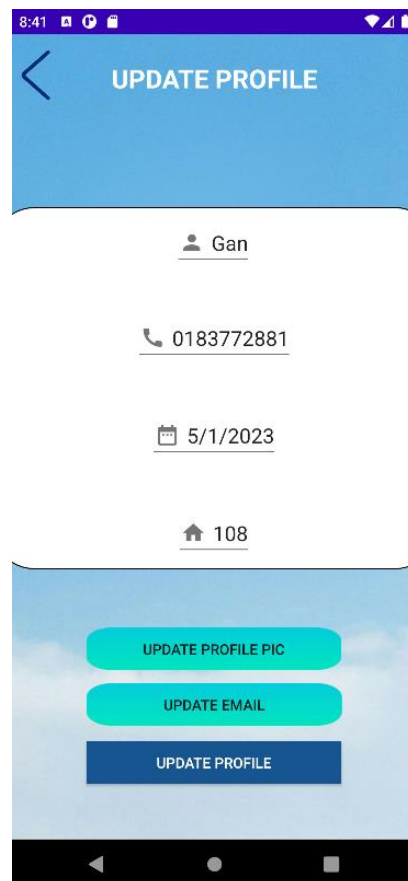

Figure 4.11: Update Profile Page

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Figure 4.12: Update Profile Picture

In Update Email Page, user need to enter their old password for authentication process. Once the user has pass the authentication process then only they can enter the new email to update their email for this account.

Figure 4.13: Update Email Page

4.2.6 My Budget Page

In My Budget Page, users able to click the Add Budget button at bottom right of the screen to add their monthly budget into this application. After that, users be able to choose the type or category of the item that they want to set a budget, for example Transport, Food, House, Entertainment, Education, Charity, Apparel, Health, Personal and Others. Next, users need to enter the amount of the budget they plan and click Save button to save the budget or click Cancel button to cancel this action. Users able to view the budget that they have already add in this page which show the budgeted item, allocated amount and date allocated. Besides, users able to update the budget when they click the budget item box, a dialog box will pop out and users can enter the new amount for budget and click Save button to update or click Delete button to delete this budget.
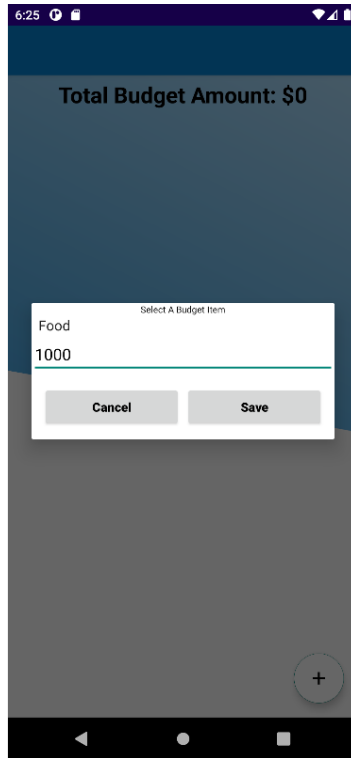

Figure 4.14: My Budget Page

Figure 4.15: Adding Budget
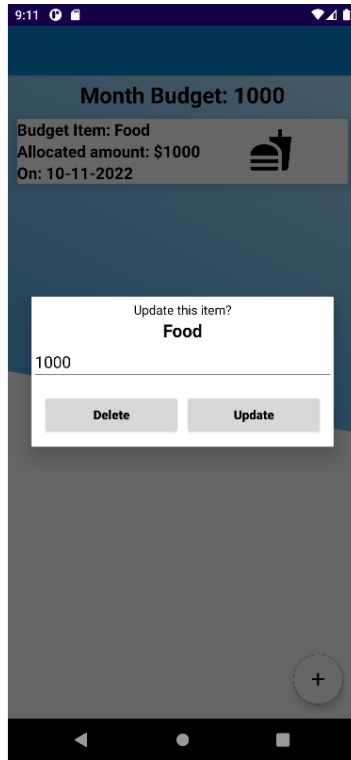

Figure 4.16: View Budget

Figure 4.17: Update Budget

4.2.7 Today Expenses Page

In Today Expenses Page, users able to click the Add Expenses button at bottom right of the screen to add their daily expenses into this application. After that, users be able to choose the type or category of the item that they want to add as a daily expenses, for example Transport, Food, House, Entertainment, Education, Charity, Apparel, Health, Personal and Others. Next, users need to enter the amount of the daily expenses and click Save button to save the daily expenses or click Cancel button to cancel this action. Users able to view the daily expenses acourding to different category that they have already add in this page which show the item, amount, note and date added. Besides, users able to update the daily expenses when they click the daily expenses item box, a dialog box will pop out and users can enter the new amount and new note for daily expenses and click Save button to update or click Delete button to delete this daily expenses.
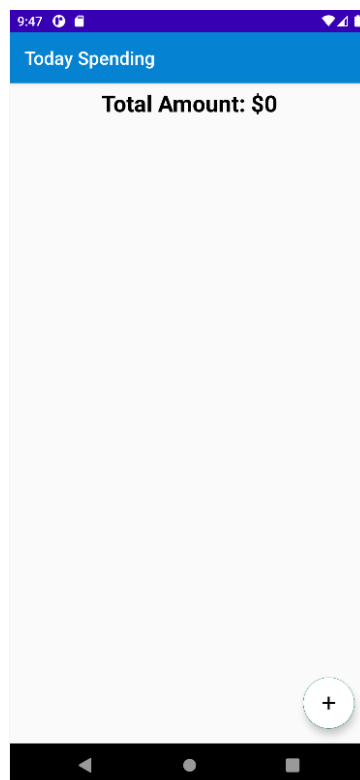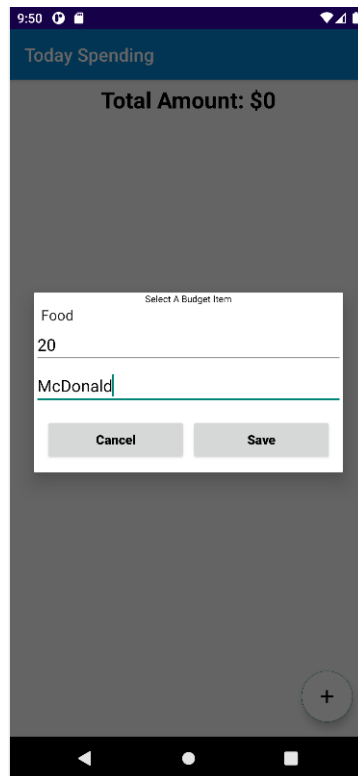

Figure 4.18: Today Expenses Page
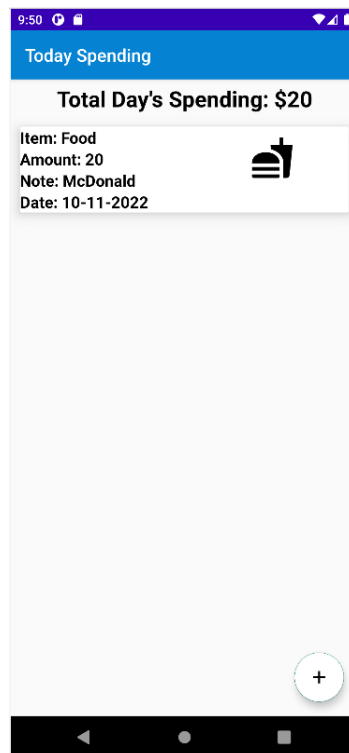
Figure 4.19: Adding Daily Expenses

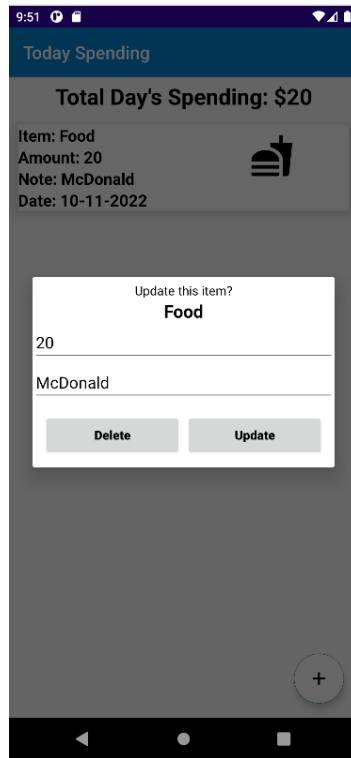**Figure 4.20: View Daily Expenses**

Figure 4.21: Update Daily Expenses

4.2.8 Weekly Expenses Page

In Weekly Expenses Page, users able to view the weekly expenses according to different category that they have already add in Daily Expenses Page which show the item, amount, note and date added.

Figure 4.22: Weekly Expenses Page

4.2.8 Monthly Expenses Page

In Monthly Expenses Page, users able to view the monthly expenses according to different category that they have already add in Daily Expenses Page which show the item, amount, note and date added.
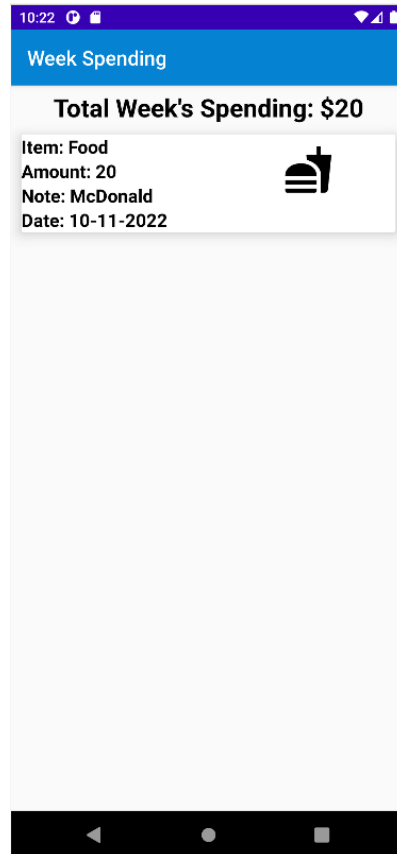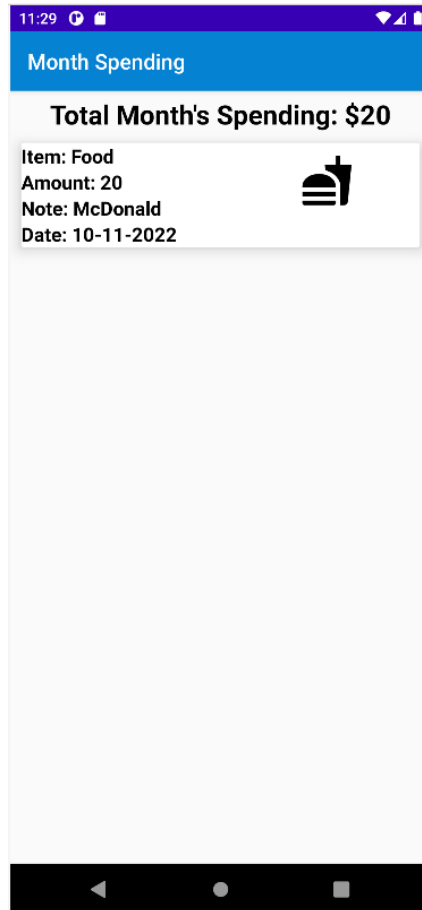

Figure 4.23: Monthly Expenses Page

4.2.9 Analytics Page

In Analytics Page, users able to view daily analysis on the item that they're spent on. There are several information will be display in this page which is Total day's spending, Type of Expenses, Amount Spent, Total Percentage of Usage, Pie Chart which show the allocation of expenses and Summary Spending Status.

Figure 4.24: Analytics Page
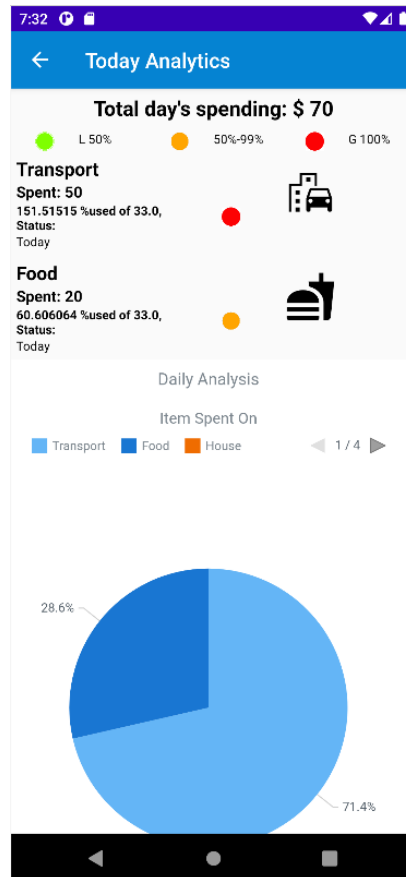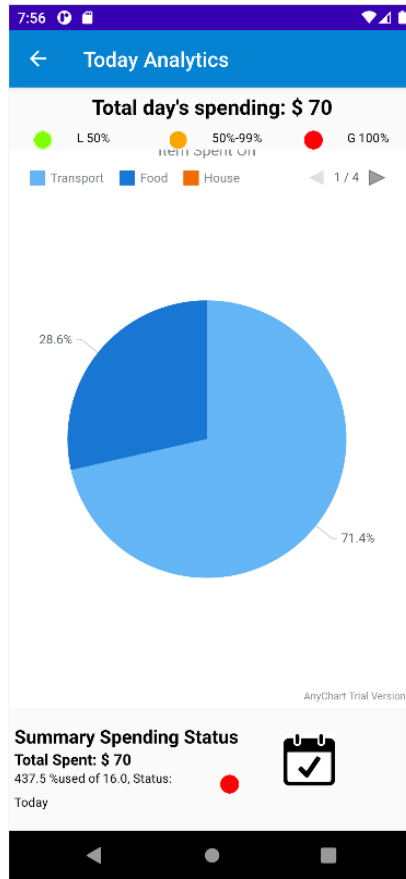
Figure 4.25: Analytics Page

4.2.10 History Page

In History Page, users able to search the expenses that have been recorded previously by clicking the Search button. Next, users can select a specific day, month or year to search for the expenses then click OK button to search and Cancel button to cancel action.
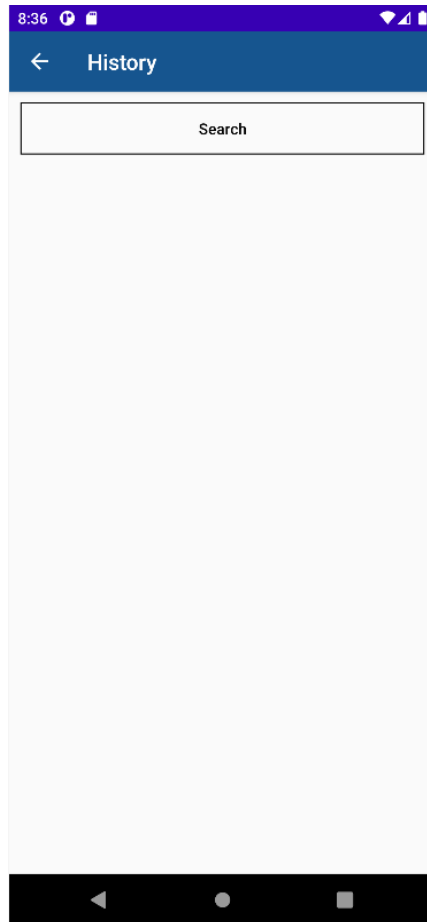
Figure 4.26: History Page
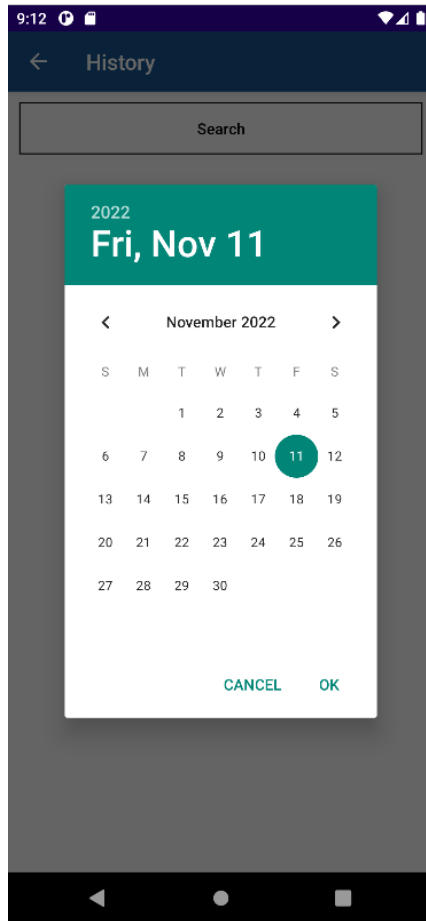
Figure 4.27: Search Date

4.2.11 Achievement Page

In Achievement Page, users able to view the available achievements that have been collected by the user. There are total of 5 achievement available in this application which are New Comers, Keep Going, Well Done, Not Bad and Fantastic Job. Each achievement has different target need to be complete to get the achievement. Each achievement have different difficulties to achieve and different medal which is gold,silver and bronze.
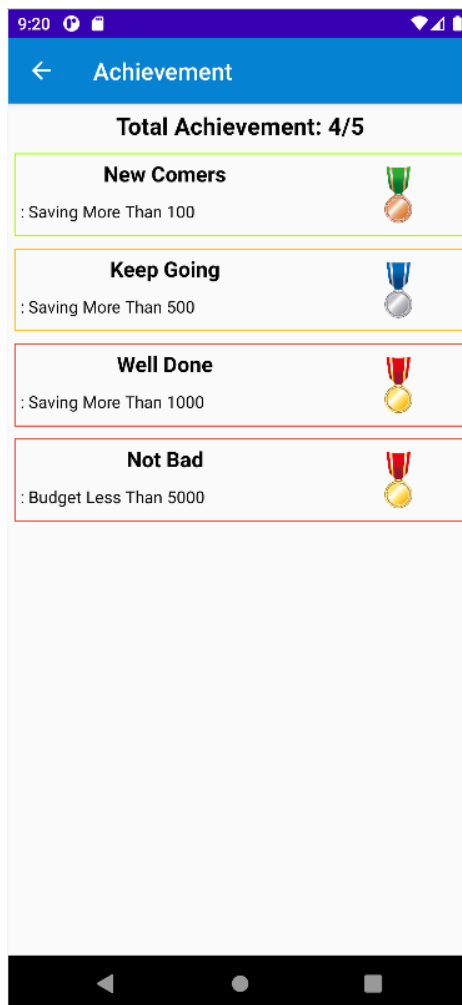
Figure 4.28: Achievement Page

4.2.12 Feedback Page

In Feedback Page, users able to provide their feedback about this application along with the experience of their using this application, any improvement, changes in their daily life or suggestions while using this application in daily life. This page contains have two button which is Feedback History button and Submit button, one radio list for select the rating and an edit text box for entering the feedback from users. After users click the Feedback History button, it will take user to Feedback History Page. Inside this page uses can edit or delete the feedback that have been written by them. When users click Edit button, users able to edit their feedback and click Save Edit button to save their new feedback.

Figure 4.29: Feedback Page

Figure 4.30: Feedback History

Figure 4.31: Edit Feedback

4.3 Testing & Result

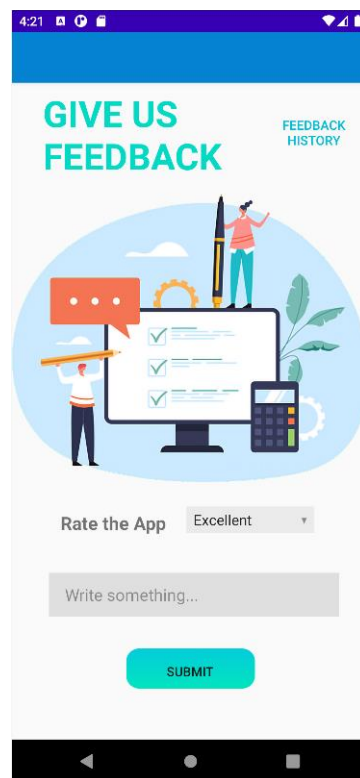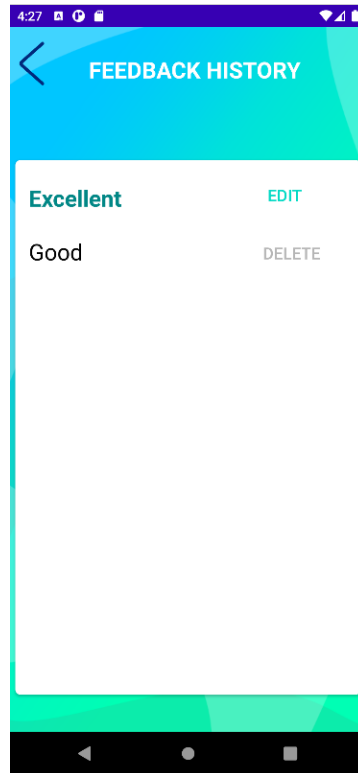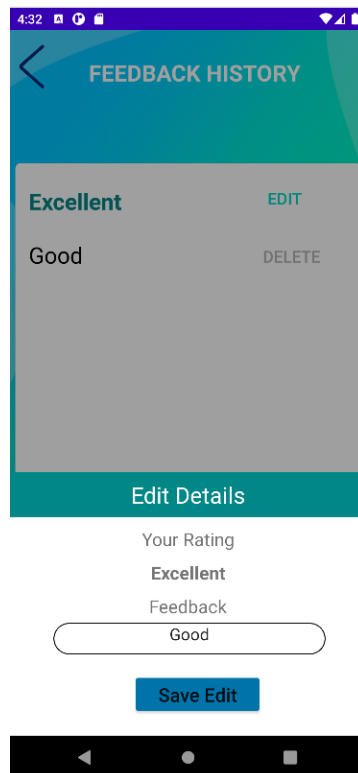Functionality Acceptance Testing, User Acceptability Testing and Usability Testing have been performed on this application. Functionality Acceptance Testing, a type of software testing, evaluates specific units or programme components. Unit testing is used to make sure that every piece of software code functions as it should. A checklist is made while running unit testing to make sure that no features are overlooked. The Login page, Sign Up page, Main Menu page, User Profile page, Upload Picture page, Update Profile page, Update Email page, My Budget page, Today Expense page, History page, and Feedback page are 11 components of the unit test. Each component's buttons are checked individually. The "Success" column is checked if the components function as planned. If the components do not function as anticipated, the "Failed" column is indicated. A comment is needed if the functions don't run as planned. The results of the unit testing are shown in Table 4.1.

No.	Test Case	Success	Failed	Remark
1.	**Login Page**			
	- Login Button	/		
	- Sign Up Button	/		
	- Forgot Password Button	/		
2.	**Sign Up Page**			
	- Login Button	/		
	- Sign Up Button	/		
3.	**Main Menu Page**			
	- User Profile Button	/		
	- Update Profile Button	/		
	- My Budget Button	/		
	- Today Expenses Button	/		
	- Weekly Expenses Button	/		
	- Monthly Expenses Button	/		

	- Analytics Button	/		
	- History Button	/		
	- Achievement Button	/		
	- Feedback Button	/		
	- Logout Button	/		
4.	**User Profile Page** - Back Button	/		
5.	**Upload Picture Page** - Choose Picture Button - Upload Button	/ /		
6.	**Update Profile Page** - Back Button - Update Profile Pic Button - Update Email Button - Update Profile Button	/ / / /		
7.	**Update Email Page** - Update Email Button - Authenticate Button	/ /		
8.	**My Budget Page** - Add Budget Button	/		
9.	**Today Expenses Page** - Add Expenses Button	/		
10.	**History Page** - Search Button	/		
11.	**Feedback Page** - Rating Radio Button - Text Button	/ /		

	- Submit Button	/		
	- Feedback History Button	/		

Table 4.1: Functionality Acceptance Test

The last step in the software testing process is the Usability Test and User Acceptance Test, or UAT. Real software users test the programme during UAT and Usability Test to ensure that it satisfies the requirements and can carry out the defined tasks under realistic conditions. One of the last and most important project phases that must be completed before the application is made available to the public is user acceptance testing (UAT) and usability test. An open survey is given to public user for become the end users for this project to undertake user acceptance tests for the MSAG using Google Form.

i.   Usability Testing

This application was tested by 30 public users and the results of the usability testing are listed below. Figure 4.32 shows the result for question one.

Employment Status
30 responses

- 🔵 Employed for wages
- 🔴 Self-employed
- 🟠 Student
- 🟢 Retired
- 🟣 Seeking opportunities currently
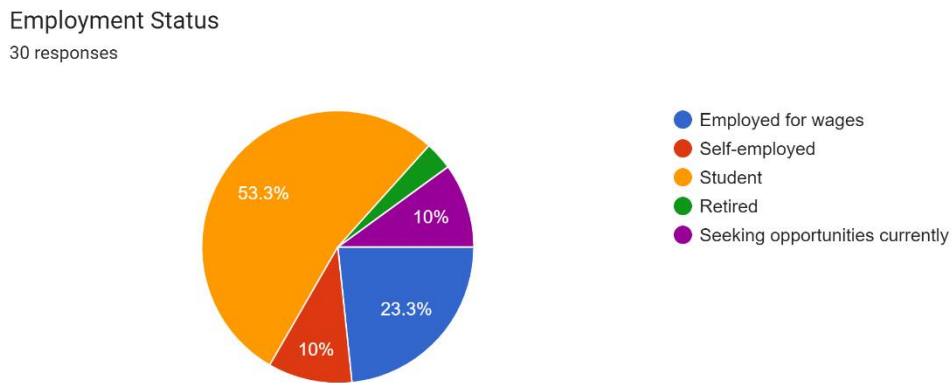
53.3% 10% 23.3% 10%

Figure 4.32: Result for question one

Refer to Figure 4.32, it shows that 53.3% of the public users are students, 23.3% are users which employed for wages, 10% are users which self-employed and seeking opportunities currently and the remaining 3.3% are users which retired.

Annual Income

30 responses

- Less than RM20,000
- Between RM20,000-RM50,000
- Between RM50,000-RM80,000
- More than RM80,000
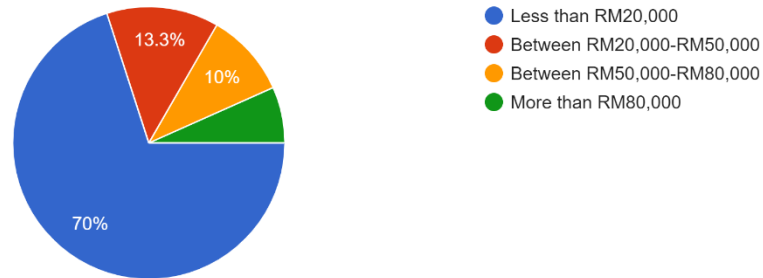
Figure 4.33: Result for question two

Refer to Figure 4.33, it shows that 70% of the public user's annual income are less than RM20,000, 13.3% are users between RM20,000 – RM50,000, 10% are users between RM50,000 – RM80,000 and the remaining 6.7% are users more than RM80,000.

Does Login Function works correctly?

30 responses

- Yes
- No

Figure 4.34: Result for question three

Refer to Figure 4.34, it shows 100% of users said that the Login function is working successfully, based on the responses provided.

Does Sign Up Function works correctly?

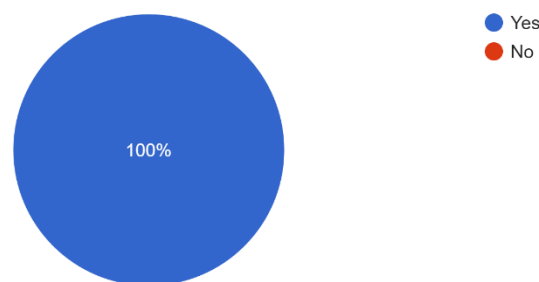30 responses

Legend:
- Yes
- No

100%

Figure 4.35: Result for question four

Refer to Figure 4.34, it shows 100% of users said that the Sign-Up function is working successfully, based on the responses provided.

Does Update Profile Function works correctly?

30 responses

Legend:
- Yes
- No

100%

Figure 4.36: Result for question five

Refer to Figure 4.34, it shows 100% of users said that the Update Profile function is working successfully, based on the responses provided.

Does Add Budget Function works correctly?
30 responses

● Yes
● No

100%

Figure 4.37: Result for question six

Refer to Figure 4.34, it shows 100% of users said that the My Budget function is working successfully, based on the responses provided.

Does Analytics Functions works correctly?
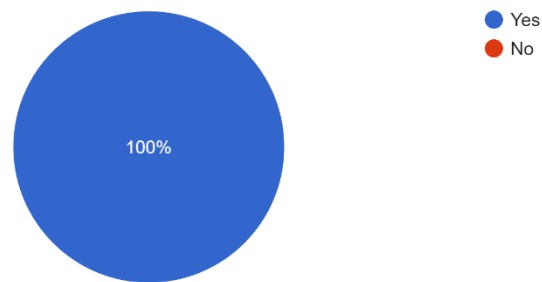30 responses

● Yes
● No

100%

Figure 4.38: Result for question seven

Refer to Figure 4.34, it shows 100% of users said that the Analytics function is working successfully, based on the responses provided.

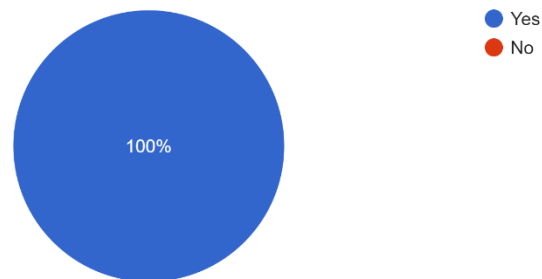Does Achievement Function works correctly?
30 responses
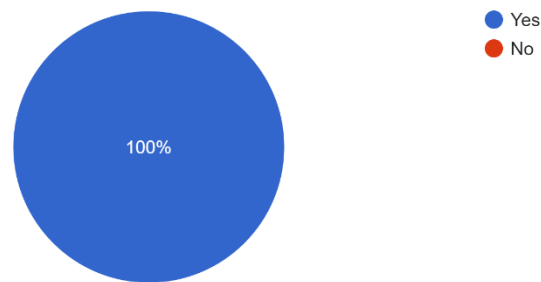
Figure 4.39: Result for question eight

Refer to Figure 4.34, it shows 100% of users said that the Achievement function is working successfully, based on the responses provided.

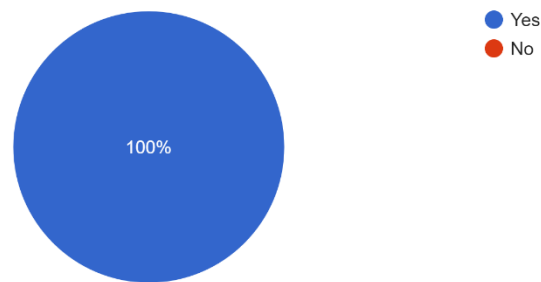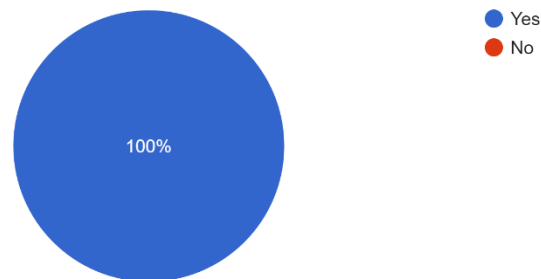Does Feedback Function works correctly?
30 responses
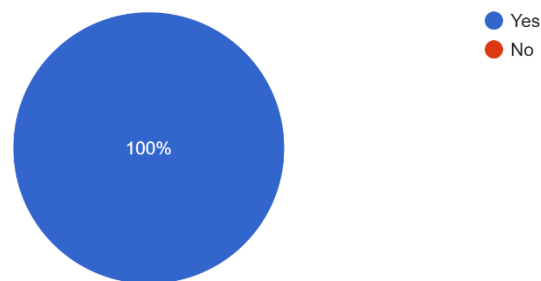
Figure 4.40: Result for question nine

Refer to Figure 4.34, it shows 100% of users said that the Feedback function is working successfully, based on the responses provided.

On scale 1-5, rate this mobile application. (1-Very Unsatisfied, 2-Unsatisfied, 3-Neutral, 4-Satisfied, 5-Very Satisfied)

30 responses

Figure 4.41: Result for question ten

Refer to Figure 4.34, it shows the all-user replies, 76.7% of users are very satisfied with the Mobile Savings Application with Gamification, 10% are satisfied with the Mobile Savings Application with Gamification and 13.3% are feel neutral with the Mobile Savings Application with Gamification. This indicates that most users are pleased with the MSAG application.

What is your suggestions/comments/feedback towards this Mobile Savings Application with Gamification (MSAG).

30 responses

It could be more colourful

Improve Sign Up interface

Better with more element to game

A very useful application!! Hopefully can be download through Google Play

We should get the notification to insert daily expenses

Good App

Great App

The interface and design of the MSAG are pretty good. Easy to use and understand.

i think the application is perfect

Figure 4.42: Result for question eleven (1)
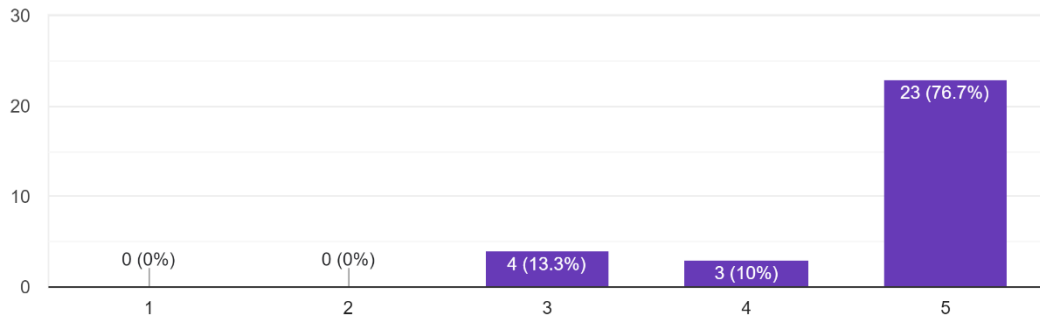
What is your suggestions/comments/feedback towards this Mobile Savings Application with Gamification (MSAG).

30 responses

To give a smoother experience

Good UI design

It work for the saving
I can save a lot by using this application

Nice

The performance is pretty good.

This need to improve the skills

Nice

This is a very nice app. I can manage my budget with ease
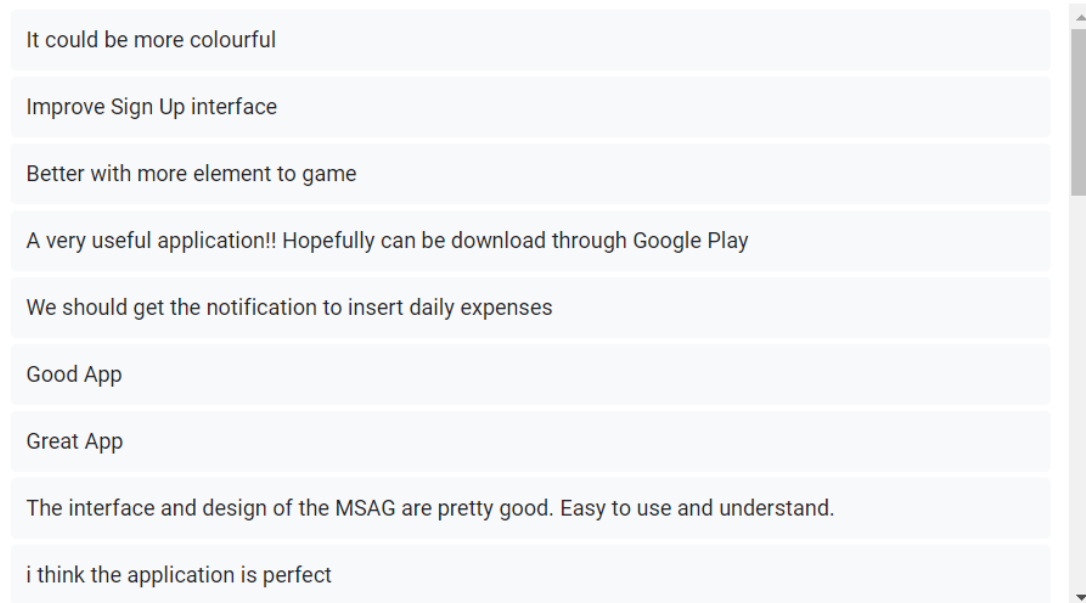
The apps really well developed.
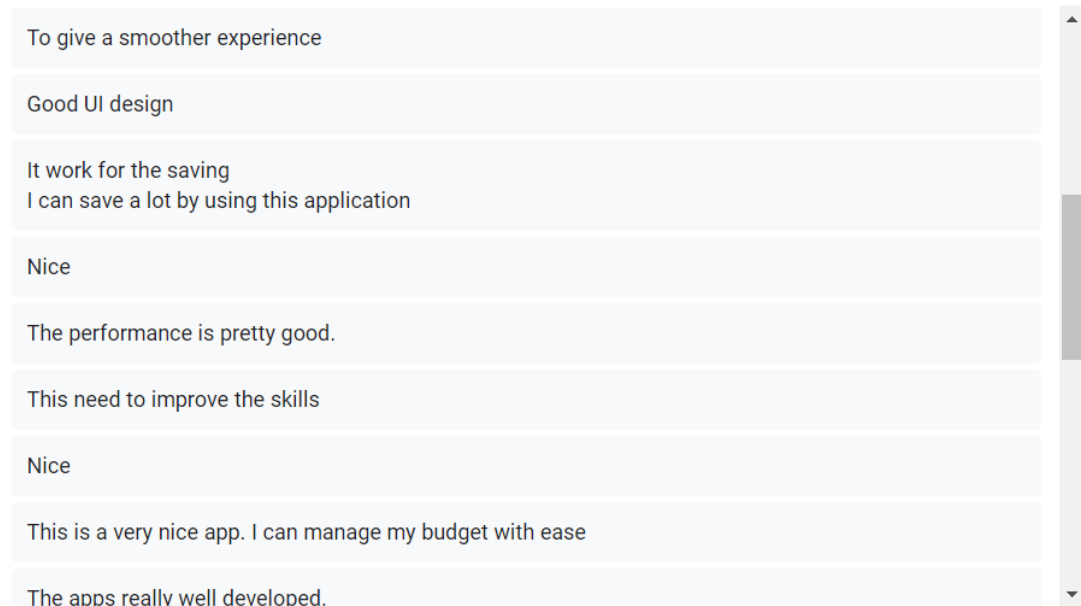
Figure 4.43: Result for question eleven (2)

88

What is your suggestions/comments/feedback towards this Mobile Savings Application with Gamification (MSAG).

30 responses

Good Apps
No
Kind a useful app
No comments
Excellent
everythings good ,no comment
Ok
Currently no
Good

Figure 4.44: Result for question eleven (3)

Refer to Figure 4.42, 4.43 and 4.44, it shows the users commented for MSAG application, mostly of the comment show positive side for this application. Only a few of users thinks that the application still not good enough. Overall, users are satisfied with the MSAG application.

ii.   User Acceptance Testing (UAT)

This application was tested by 30 public users and the results of the user acceptance testing (UAT) are listed below. Figure 4.32 shows the result for question one.

The mobile application was executed to the end of the job.
30 responses

Figure 4.45: Result for question one

Refer to Figure 4.45, it shows 96.7% of users agree that the mobile application was able to be executed to the end of the job and 3.3% of user feel neutral about this statement, based on the responses provided.

The mobile application interface is user-friendly and easily to understand.
30 responses

Figure 4.46: Result for question two

Refer to Figure 4.46, it shows 96.7% of users agree that the mobile application interface is user-friendly and easily to understand and 3.3% of user feel neutral about this statement, based on the responses provided.

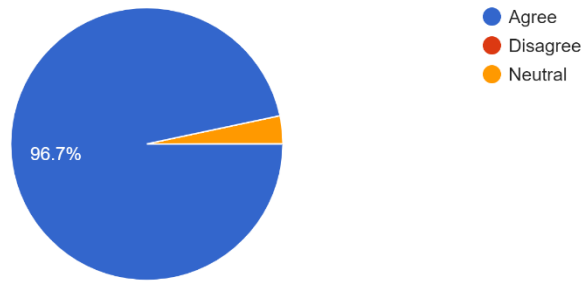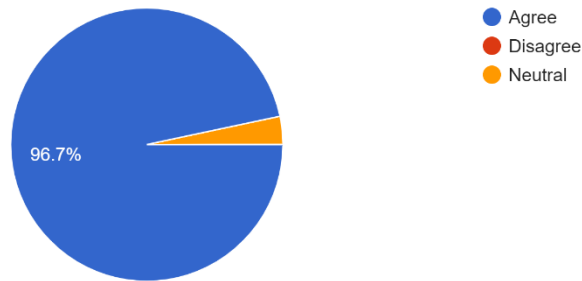The mobile application has an appropriate font size for the user to use with.
30 responses
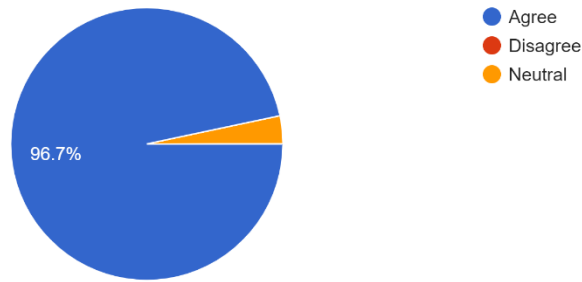
Figure 4.47: Result for question three

Refer to Figure 4.45, it shows 96.7% of users agree that the mobile application has an appropriate font size for the user to use with and 3.3% of user feel neutral about this statement, based on the responses provided.

The mobile application overall experience is easy to use.
30 responses
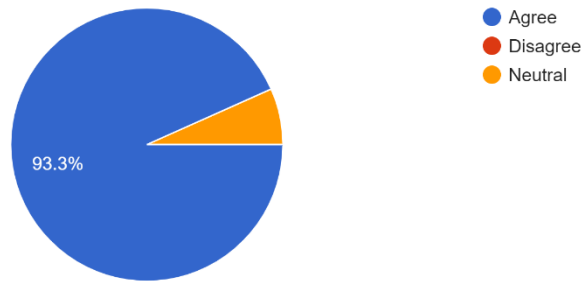
Figure 4.48: Result for question four

Refer to Figure 4.45, it shows 93.3% of users agree that the mobile application overall experience is easy to use and 6.7% of user feel neutral about this statement, based on the responses provided.

The mobile application overall experience is fun.
30 responses

Figure 4.49: Result for question five

Refer to Figure 4.45, it shows 93.3% of users agree that the mobile application overall experience is fun and 6.7% of user feel neutral about this statement, based on the responses provided.

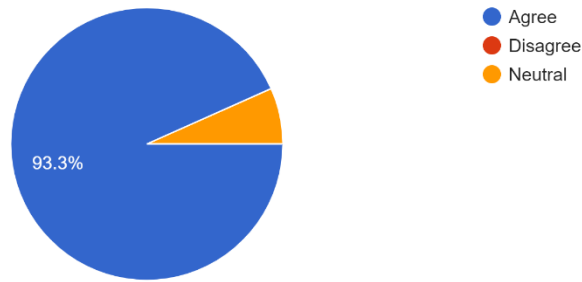The mobile application gives help in doing daily/weekly/monthly budget.
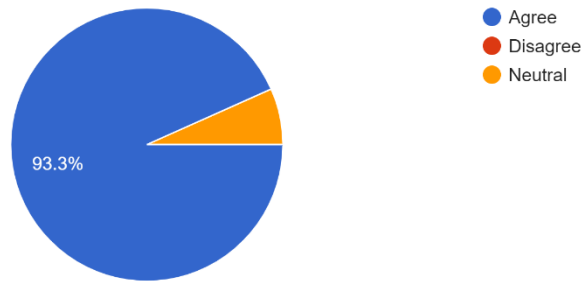30 responses

Figure 4.50: Result for question six

Refer to Figure 4.45, it shows 93.3% of users agree that the mobile application could give help in doing daily/weekly/monthly budget and 6.7% of user feel neutral about this statement, based on the responses provided.

4.4 Discussion

Mobile Savings Application with Gamification (MSAG) is a useful mobile application. This mobile application is designed in such a way that anyone may use it, even if they are not an expert. The focus of this application is on gamification technique to encourage user using mobile saving application with gamification. The goal of developing this application is to encourage users make early planning in their financial and increase their awareness of savings in current environments.

For first time user, the user needs to create a new account at the sign-up page by entering their name, email, phone number, date of birth, address, and password. After that, user need to verify their account at their mailbox with the email that they fill in. The first page that show after user has login is the user profile page which will show all personal detail that user have enter when create account, user can add their profile picture in this page by clicking the profile picture box. If user want to update their personal information, they can select the update profile function at main menu and do so.

Next, user could start to do budgeting with adding their monthly budget in the my budget function. They could choose which type of budget they want to create and the amount they want as budget. If user, make a wrong mistake they could edit it back by clicking the budget they want to edit. Besides, user could add they daily expenses in the daily expenses function. They need to click the add button at right bottom corner, and select the type of expense, insert expenses amount and note that want to remark to add a complete expense. If user, make a wrong mistake they could edit it back by clicking the expenses they want to edit.

Furthermore, user could view the weekly and monthly expenses in the weekly and monthly expense's function page. User could do analysation on the analytics function to know everyday financial usage and do further planning. If user want to check back the expenses that have make on previous date, they could search for it at history function. Others than this, user could view the achievement that have been completed by them in the achievement function page. User could provide their useful feedback on the feedback function. They could rate this application and write down their comment or suggestion.

Finally, all users may log out by visiting the menu page and selecting the Logout option. By selecting Forgot Password on the Login page and inputting a legitimate email address, those who have forgotten their password can get it reset. This application's ability to stay always signed in when a user logs in is one of its benefits. Only once the user has done so will it log out.

4.5 Summary

This chapter discusses and elaborates on the effects of each page or function. This chapter illustrates the project's output or outcome. The product includes a screenshot of a fully working mobile application. Each page and feature are shown in great detail and with complete explanations. The discussion of the ultimate result follows.

Chapter 5 : CONCLUSION

5.1 Introduction

Finally, the goal of this system is to create a mobile savings application with gamification for the society. The goal is to encourage user using mobile savings application with gamification for managing their financial. Such a programme has not yet been created and made available in Malaysia. With this programme, a user may manage a monthly budget and keep track of everyday costs. The features of this programme can help users track their own finances more effectively. The Java programming language and Android Studio were used to create this application. For all users, this programme has seven features. One of the features allows the user to display a pie chart of their daily spending depending on the daily expenses they have entered for the day.

Additionally, depending on the outcomes of the prior chapter, this mobile application has succeeded in its objective (Chapter 4: Results and Discussions). Therefore, it is obvious that this smartphone application is advantageous to society. User Acceptance Testing is performed on each button and software feature. Because the function required to satisfy user demands and accomplish the program's objective, it helps with the evaluation of the complete application.

5.2 Limitation

Although the project was successfully finished, there are certain restrictions in the mobile application development and outcomes. One of the limits is time. This mobile app was developed in a remarkably short period of time. This programme only has seven functions for all users, one of it was gamification. The capabilities that are accessible to each user cannot be covered in the time allowed, especially in gamification part.

Due to the fact that this programme was developed on the Android platform, users will encounter one restriction while testing or using it. Only users of the Android operating system will be allowed to use it.

Finally, internet connectivity is a need for people who want to utilise this mobile application. Only other users with internet connection may provide the most recent information to users. Additionally, in order to download this mobile application, the user must have an Android device.

5.3 Future Work

There are still certain areas that can use updates and enhancements. To ensure that users of other operating systems may use it, this application might be created for the iOS platform. Given the tremendous rise in popularity of the iOS operating system in recent years, it is important that the iOS platform be designed such that users of both platforms may make use of this programme.

This application can be utilised in more gamification part, such as rewards, points and ranks system. Because nowadays user are more attracted toward gamification where it will bring more interesting interactions for user and can gain something from something which they are using everyday.

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Appendix A: Gantt Chart

Gantt Chart of Mobile Savings Application with Gamification
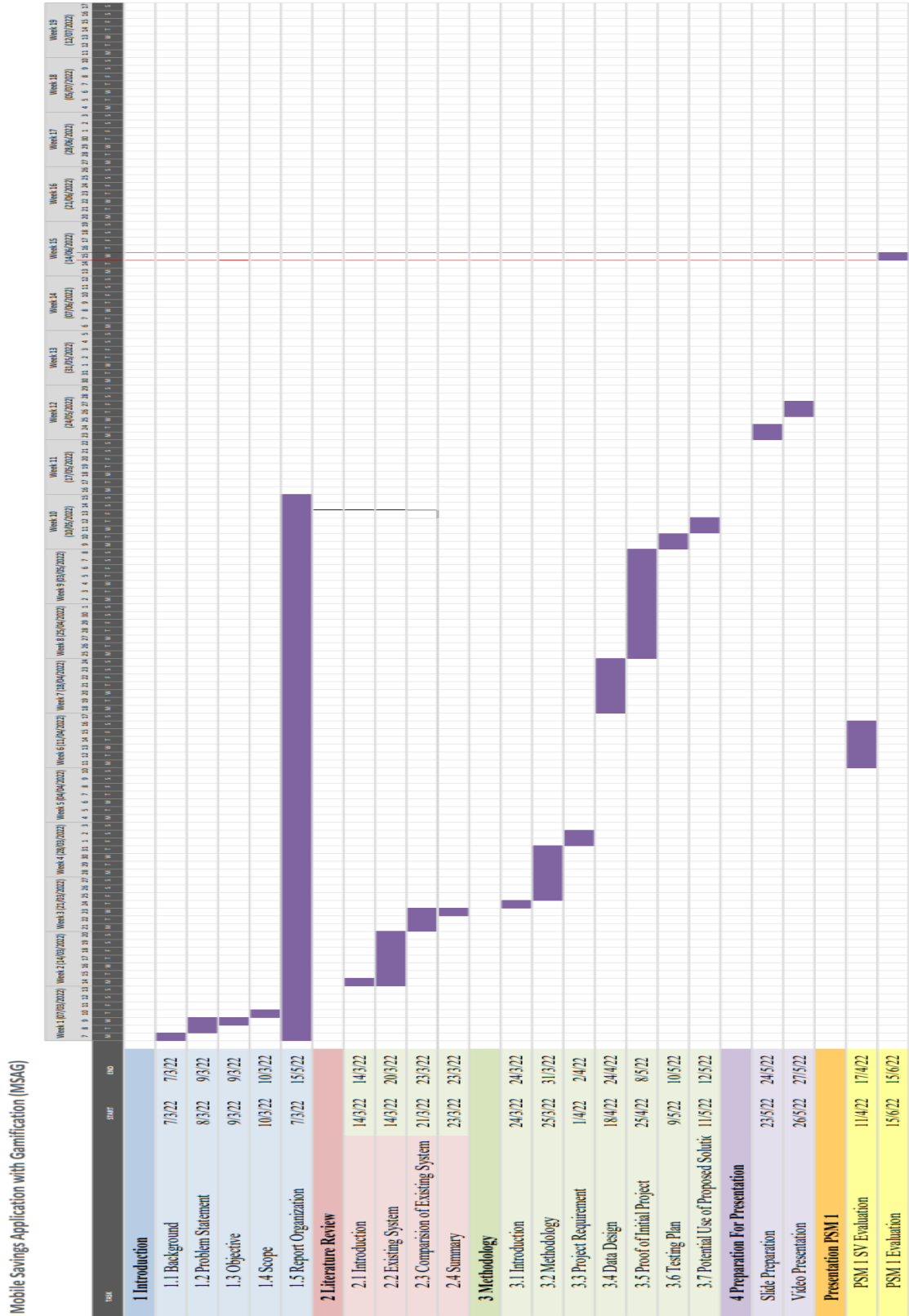
Mobile Savings Application with Gamification (MSAG)
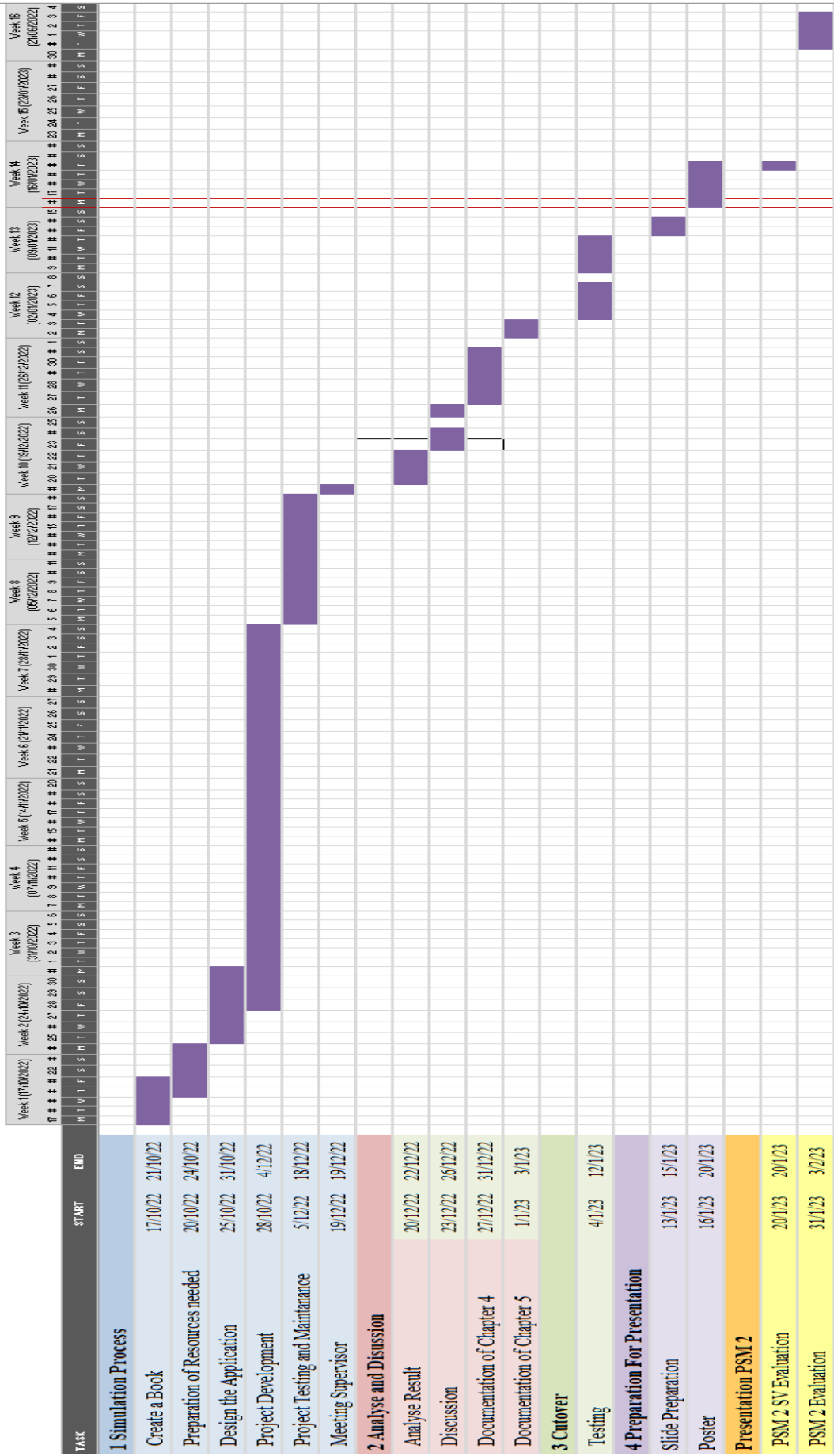
Appendix B: Usability & User Acceptance Testing

Usability & User Acceptance Testing for Mobile Savings Application with Gamification (MSAG)

hao991229@gmail.com (not shared) Switch account

* Required

Demographics

Employment Status *

○ Employed for wages

○ Self-employed

○ Student

○ Retired

○ Seeking opportunities currently

Annual Income *

○ Less than RM20,000

○ Between RM20,000-RM50,000

○ Between RM50,000-RM80,000

○ More than RM80,000

Usability Test

Does Login Function works correctly? *

○ Yes

○ No

Does Sign Up Function works correctly? *

○ Yes

○ No

Does Update Profile Function works correctly? *

○ Yes

○ No

Does Add Budget Function works correctly? *

○ Yes

○ No

Does Add Today Expenses works correctly? *

○ Yes

○ No

Does Analytics Functions works correctly? *

○ Yes

○ No

Does Achievement Function works correctly? *

○ Yes

○ No

Does Feedback Function works correctly? *

○ Yes

○ No

On scale 1-5, rate this mobile application. (1-Very Unsatisfied, 2-Unsatisfied, 3-Neutral, 4-Satisfied, 5-Very Satisfied) *

	1	2	3	4	5	
Very Unsatisfied	○	○	○	○	○	Very Satisfied

What is your suggestions/comments/feedback towards this Mobile Savings Application with Gamification (MSAG). *

Your answer

User Acceptance Test (UAT)

The mobile application was executed to the end of the job. *

○ Agree

○ Disagree

○ Neutral

The mobile application interface is user-friendly and easily to understand. *

○ Agree

○ Disagree

○ Neutral

The mobile application has an appropriate font size for the user to use with. *

○ Agree

○ Disagree

○ Neutral

The mobile application overall experience is easy to use. *

○ Agree

○ Disagree

○ Neutral

The mobile application overall experience is fun. *

○ Agree

○ Disagree

○ Neutral

The mobile application gives help in doing daily/weekly/monthly budget. *

○ Agree

○ Disagree

○ Neutral