

# **MEAL ORDERING APPLICATION FOR FAST FOOD RESTAURANT**

By

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## CERTIFICATION DECLARATION

I hereby certify that this report and the project it describes is my original work and is not taken from the work of others save and to the extent that such work has been cited and acknowledged in the report.

Student:

Signed: \_\_\_\_\_ Student No: \_\_\_\_\_ Date: \_\_\_\_\_

Supervisor:

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

## **ABSTRACT**

This report discusses the research done on the chosen topic, which is **MEAL ORDERING APPLICATION FOR FAST FOOD RESTAURANT**. This project shows that this application can improve the method of buying meals at fast food restaurant in Malaysia. The objective of this study is to develop an Android application that can improve on efficiency of our current queuing system in fast food restaurant. The scope of study is Android programming language, QR code technology, and their ability to be used as a new ordering technique for fast food restaurant customers. Current situation of ordering meals that happens in fast food restaurant will be explained in detail in the background of study. The literature review component explains on the studies that had been done in pre-development and post-development of the project, which will discuss on research related to queuing system, QR code technology, and spending behavior. The methodology section will explain the software development method being applied in order to complete the project which is the Rapid Application Development (RAD). Every phase in the process of developing the software will be provided such as the System Design phase, Prototyping phase, and also the Process Flow. The recommendation section will talk about any improvements that can be done in the future to keep the application up to date. The conclusion section concludes the overall project.

## **ACKNOWLEDGEMENTS**

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background of Study

Fast-food as we all are well informed is a food that is meant to be prepared in a very short time. The term fast-food also is related to a food that is being sold at a restaurant with pre-cooked ingredients which ensure the serving time to be as low as possible. This means that customers of the restaurant can order and receive their meal in a very short waiting time.

Fast-food restaurants such as McDonald's, KFC, and Burger King are very famous among Malaysian citizens. These restaurants are packed with customers almost every single hour of their operating time, especially on peak hours such as during lunch and dinner. This situation leads to a problem of long waiting time in receiving meals after ordering at the counter. This problem obviously will deny the term "fast-food" used by the restaurant in order to attract customers as the waiting time is no longer short like what a normal people would expect from a fast-food restaurant.

Currently, customer will enter the restaurant and go straight away to the counter to order their meal. They can view the menu from the board on the wall and also from the counter's table. Next customer that come in the restaurant will queue next to the first person that came in, which still taking his/her time looking at the menu to order. Customer tends to take a long time to look at the menu and select which meal suits their taste or budget. Some of the meal selected is unplanned and random and overspending commonly happen at this point. This situation will repeat and the queue is going to be longer and longer every time a new customer steps in the restaurant. Long queue will definitely cause longer waiting time for each customer to have their turn ordering.



This situation can be handled if there is a modification made to the current system of ordering meals in the restaurant. The current single-channel waiting line system used by fast-food restaurant can be altered by implementing mobile technology to improve on efficiency and performance.

## **1.2 Problem Statements**

The problem statements of this project are:

- Customers take long time ordering meal in fast food restaurant causing long queues.
- Customers often decide on meal selection while at the counter causing add and drop of items in order list, which takes time.

Despite the number of customers in the restaurant, it is every customer's choice to eat inside the restaurant instead of using drive through or delivery service. This situation is inevitable and nothing much can be changed. So alterations need to be made to other contributor of the problem which is the ordering system.

We can say that the problem of long queue actually came mainly from the long time taken by each customer to order, and also from an unplanned meal selection which will involve add and drop of meal from the list of order that also takes time.

### 1.3 Objective and Scope of Study

The objective of this project is:

- To develop an Android application that can improve on efficiency of our current queuing system in fast food restaurant.

The application named Turbo Meal will be developed for android platform phones and tablets in order to ease fast-food lovers to order their meals in their selected restaurant without having to wait too long to order their meal. Turbo Meal will provide current menus including their prices from several fast-food restaurants for user's view, and they can select every meal that they want from the menu to build a list of order. It will then be converted into QR code to be scanned at the counter before payment.

**The scope of study** is Android programming language, QR code technology, and their ability to be used as a new ordering technique for fast food restaurant customers. With the availability of QR code generation through Android programming, ordering will be easier as user interact with the application in generating their purchasing list. Efficiency is the main point being focus in the study.

**The targeted users** for this application are young fast-food enthusiasts between 18 years old to 35 years old, in which this range of age is the main contributors in fast food purchasing. This application is also targeting on fast food restaurants such as KFC, McDonald and Burger King, by which these three restaurants experience the longest queue during peak hours.

### 1.4 Feasibility Study

This feasibility study of this project is done using the SWOT analysis, in order to uncover the strengths and weakness of this project. This will also shows the relevancy of this application to the market.

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"><li>• Developed for the most famous mobile phone OS.</li><li>• New in android market.</li><li>• Easy to be marketed on Google Play.</li></ul>	<ul style="list-style-type: none"><li>• Need to be updated frequently.</li><li>• Does not support online payment.</li></ul>	<ul style="list-style-type: none"><li>• Simple programming for additional functions in the future.</li><li>• Can be expanded to iOS and Windows Phone platform.</li></ul>	<ul style="list-style-type: none"><li>• Might be illegally cracked.</li><li>• Competition with other developers.</li></ul>

**Figure 1:** SWOT Analysis

From the SWOT analysis, it can be concluded that the Turbo Meal is feasible and relevant to be developed. All of the weaknesses can be improved in the future as the technology of online payment and synchronization is possible to be implemented.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Understanding Fast-food Restaurant**

##### **2.1.1 Definition of Fast Food Restaurant.**

Fast food restaurant or also known as Quick Serve Restaurant (QSR) is a restaurant that serves fast food cuisine with minimal table service. Customers usually come to fast-food restaurant to buy quick and quality menu items and dine in a modern dining room. McDonald's is an example of a famous name in fast food industry and currently holds the largest fast food chain worldwide (Top 10 Fast Food Chains in the World, 2012). Based on research, the most important factor considered by customers when choosing fast food restaurant is speed (Dharmawirya, Oktadiana, & Adi, 2012).

##### **2.1.2 Consumer Spending**

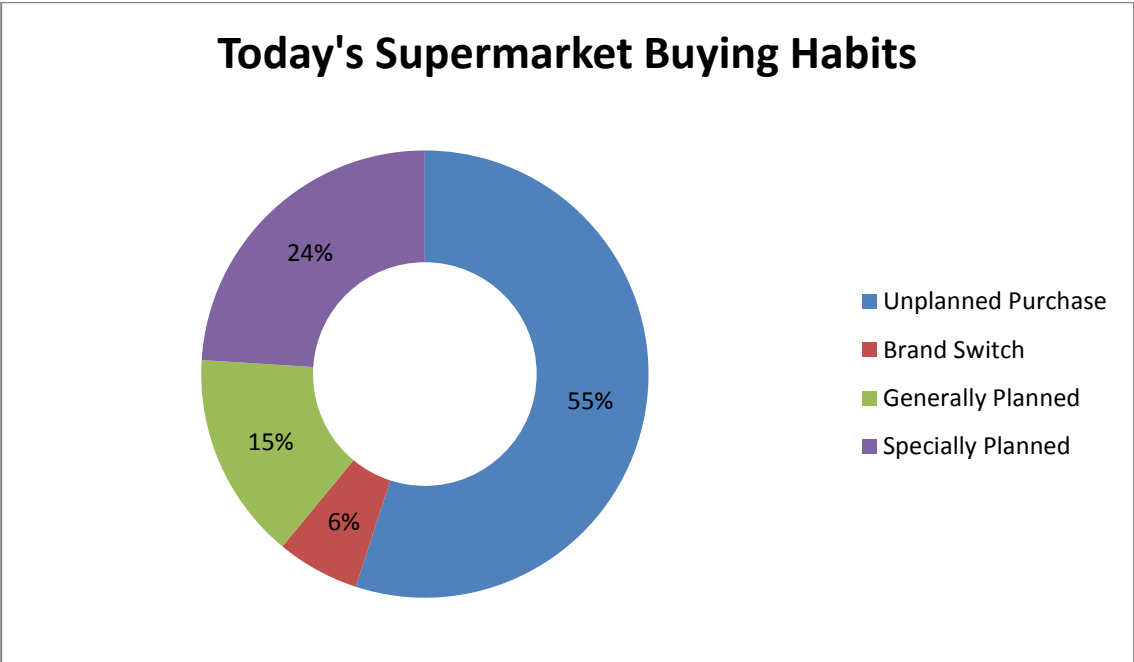
In the year 2000, it is stated that consumers spent about \$110 billion on fast food in United States which increased from \$6 billion in the year 1970 (Schlosser, 2001). This shows that the amount of consumer spending per year is dependent to the number of fast-food restaurants opened.

This statistic can also be used to reflect the consumer spending on fast-food in Malaysia as the number of fast-food restaurants in Malaysia grows year to year. Moreover, the huge number of spending made by consumer on fast-food makes it relevant to implement a new system to the current way of ordering meals in the restaurant in order to ensure smoothness of operation and shorter waiting time are served to customers.

**2.1.3 In-Store Purchasing Decisions**

As being said before, the time taken of each customer ordering at the counter is one of the reasons of long queues in fast-food restaurants, especially on peak hours. Normally, a customer will take a long time ordering at the counter because they did not plan the meal that they want to buy before entering the restaurant.

According to research made by Point of Purchase Advertising International (2012), the percentage of in-store decision rate has climbed from 70% in 1995 to 76% in 2012, while 55% from the fraction is unplanned. This means that 55% of consumers normally make their decision in buying something when they are in the store and in front of the product, which shows that they do not have proper planning for their purchase.



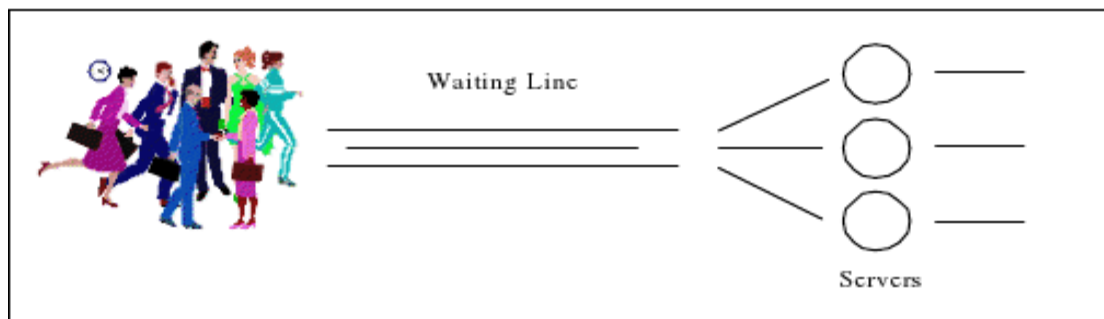
**Figure 2:** In-store Purchasing Decisions Chart

Unplanned meal selection will eventually cause the customer to take a longer time to place an order at the counter. Even if they had planned their meal, they will probably change their preference once in the restaurant if there are any current promotions going on in the restaurant, represented by 6% from Figure 2.

## 2.2 Fast Food Restaurants Queuing System

### 2.2.1 Single-Channel Queuing System

This type of queuing system can easily be found in post offices and banks, in which one single queue will diverge into a few counters (Zhang, Ng, & Tay, 2000). The customer leaving the counters will then be replaced by the head of the queue. The main disadvantage of this type of queue is that it will be too long and eventually discourage a new customer to join the queue.

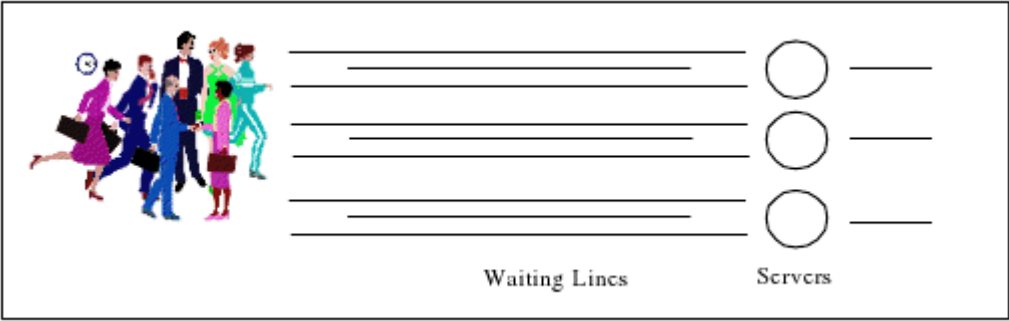


**Figure 3:** Single-Channel Queuing System Diagram

### 2.2.2 Multiple-Channels Queuing System

A normal fast food restaurants such as KFC and McDonald's are commonly observed to use the multiple-channels queuing system (Zhang, Ng, & Tay, 2000). The customers will line up in rows directly in front of each server, which is the counter.

Generally, the customer will feel happy because there are less people queuing in front of them as they are divided into numbers of rows, instead of in one row such as in a single-channel queuing system approach.

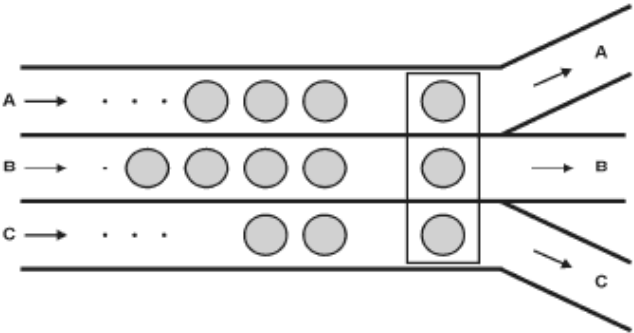


**Figure 4:** Multiple-Channels Queuing System Diagram

Although this might help to reduce the length of the queue, the waiting time to be served is still long if there are a lot of people queuing at a time. This happens because the person at the front of the queue will definitely take time to order.

**2.2.3 Multiple-Channels Queuing System Problems**

The multiple-channels queuing system as we know, is a combination of numbers of single-channel queuing system. So, the queuing problems in multiple-channels queuing system should be considered as several problems of single-channel queuing system (Tamtam, 2002).



**Figure 5:** Multiple-Channels Queuing System Problem

The probability of arrival of customer in line A is independent from the probability of arrival of customer in line B or C due to a different length of queue. All of the servers which are the counter are equipped with the same facilities and serves the same type of service so there is no external pressure to force customer to make decision. Normally, arrivals occur randomly and independently of other arrivals, such that the estimation of an arrival occurrence is hard to determine (Cernea, M.Jaradat, & M.Jaradat, 2010).

The queue will get messy once there are too many customers queuing who will make the queue longer and when there are problems with the current customers ordering such as taking a long time to order or add and drop of menu caused by unplanned meal selection.

## **2.3 QR Code**

### **2.3.1 Popularity of QR Code**

QR code is getting more popular day by day, and we can easily see it everywhere. It is increasingly being used in public transportation hubs, magazines, and in stores. The popularity of QR code is also said to be tied to the increasing prevalence of smartphones (Wilson, 2012).

A report from ScanLife, a firm that generates and manages QR codes for brands, stated that by second quarter of 2012, the company's QR codes got 16 million scans, an increase of 10 million scans as compared to 2011.

The main reason QR code being famous is because it provides a combination of combination and trendiness. As smartphone usage rises, the QR code usage also rises as only smartphone users have the opportunity to use QR codes.

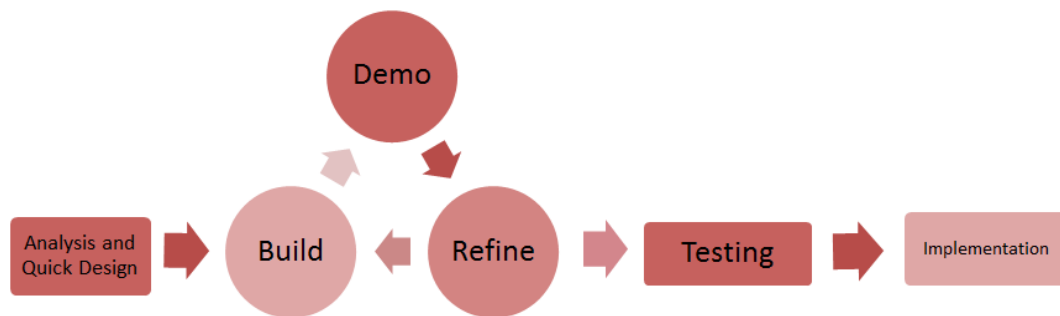


# CHAPTER 3

## METHODOLOGY

### 3.1 Introduction

Software Development Methodology in software engineering is a framework that is used to structure, plan, and control the process of developing an information system. There are numbers of methodologies available in system development process, such as Structured Systems Analysis and Design Method (SSADM), Joint application Design (JAD), Prototyping, and Rapid Application Development (RAD). RAD model is being selected to be used in the development of Turbo Meal as it is the most suitable model to be used in short period development of application.



**Figure 6:** Rapid Application Development (RAD) Diagram

Rapid Application Development (RAD) is a software development methodology that emphasis on minimal planning and maximal and efficient prototyping. This methodology delivers faster development speed and any change of requirements can be done easier.

The user's requirement needed in this methodology is defined by structured prototyping and techniques, in which the prototyping is being used to verify the requirements. User will interact frequently with developer in order to ensure the relevancy of each requirements and functionality of the system.

### **3.2 Tools and Equipment**

In this project, there are several tools that is going to be used to make this project a success. The tools are:

- Adobe Photoshop CS5

This software will be used for GUI rendering and picture editing.

- Android SDK Development Tools

The Android SDK development tools is the most important tools in this project as it is the programming and compiling program of the Android application. It is widely used in Android application development nowadays and have a very huge community around the world so that it is easy to gain access to the coding tutorial and also, error and bug fixing solutions.

- 3 Android mobile phone

All of the phones are running on different version of Android, which are the Jelly Bean (Samsung Galaxy SIII), Ice Cream Sandwich (Samsung Galaxy SII) and Gingerbread (Samsung Galaxy Y). This is because the application needs to be tested on these devices for compatibility issues.



**Figure 7:** Android Mobile Phones for Testing

- Android tablet

An Android tablet, Toshiba Regza AT270 running on Ice Cream Sandwich will be used to test the compatibility of the application in tablet, which uses a higher screen resolution.



**Figure 8:** Toshiba Regza AT270

- Personal Computer(PC)/ Workstation

The PC will be used in rendering all the graphics needed for the application and also, will be used for coding and compiling of the application. The PC spec is customized to produce favourable performance in order to process heavy graphic rendering and programming. The PC spec is as stated below:

**CPU:** Intel Core i5-2310 2.90GHz

**GPU:** Sapphire HD7850 1GB DDR5

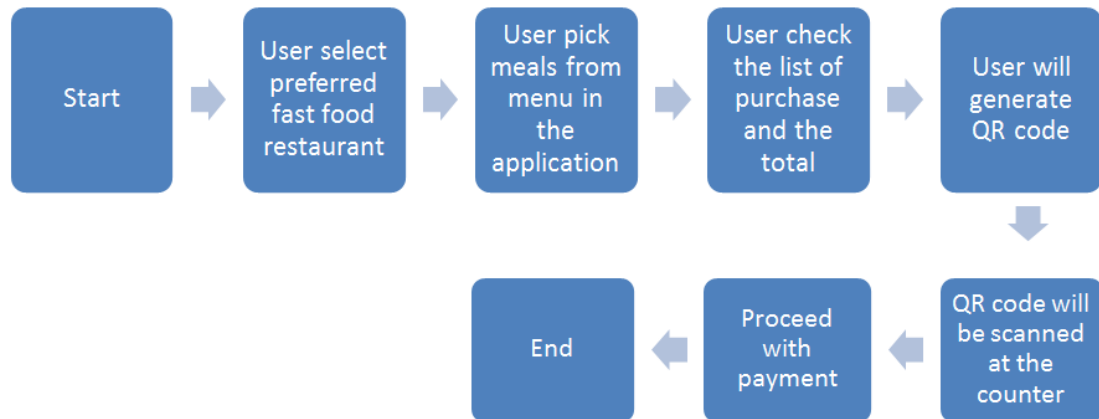
**RAM:** Kingston 4GB x 2 (Total of 8GB RAM)

**HDD:** Wester Digital Caviar Blue 500GB

### 3.3 Project Phases

#### Phase1: Analysis and Quick Design Phase

Analysis and Quick Design is the first phase in Rapid Application Development and provides the opportunity of developer and high-end users to interact in defining the requirements of the system. The system and user requirements are set at this phase so that it a clearer view on the application can be defined. Both system planning and analysis are being handled in this phase, in which user and developer will discuss on the problem statement and try to find solutions on the problem faced. Discussion on project scope and system constraints will also take place in this phase. The process flow and will be done in order to give a view to the user on how the application will work in real life situation.



**Figure 9:** Turbo Meal Process Flow Diagram

The last step to be done in this phase is to create a system design, according to the flow chart. This is the part in which the GUI of the application is drafted to show the sequence of item displayed in the application. This is important in order to avoid any problems in arranging functions in the application.



**Figure 10:** Turbo Meal System Design Diagram

## Phase 2: Prototyping Phase

Prototyping phase, which is actually a cycle, is the second phase in Rapid Application Development. In this phase, users will interact with developer to develop a model or prototype that caters the system processes, inputs and also outputs. The requirements agreed in Requirements Design phase will be studied in this phase and a physical design will be created. In this part, graphical design using Adobe Photoshop CS5 and Android programming using Sencha Touch development tools will be involved as it is the base of creating a working prototype.

The prototyping cycle consist of three major stages which is Build, Demonstration, and Refine. At first, a prototype needs to be build according to the agreed requirements in Analysis and Quick Design Phase. The working prototype will then be demonstrated and tested using an Android mobile phone and tablet. Any flaws will then be rectified in the refining part, or if the system does not work, a new build will be needed.

The cycle will loop until all the requirements are met and the application functioning as planned. After a well working prototype is developed, the Testing phase will take place.

## Phase 3: Testing Phase

In the Testing phase, a beta version of the application is being released to the crowds, which are Android users through file sharing websites as it is not an official release of the application yet. Publication of the release is conducted through Facebook page so that everybody interested in the application are well informed about the release and also they can easily point out and report if there is any bug in the application. This part is also important in order to check for compatibility issues if any.

#### Phase 4: Implementation Phase

After all bugs found in the Testing phase are being fixed, a final test on numbers of Android devices running on different version of Android such as Jelly Bean, Ice Cream Sandwich and Gingerbread, will be conducted before the application being released to the public. After it is tested, an official release of the application will be conducted in the Google Play so that users can easily download the application. Updates of the application will be done according to new release of meals or promotions in the selected fast food restaurants which is KFC, McDonalds, and Burger King.



### 3.4 Project Milestone

Below are the milestones for FYP1 and FYP2 in developing the Turbo Meal. There might be changes to the milestone in the future to suit for flexibility.

#### FYP 1

Activities\Week	1	2	3	4	5	6	7	8	9	10	11	12	13
Finding Supervisor	x												
Research on proposed title		x	x										
Propose final chosen title			x	x									
Project analysis					x	x	x						
Planning system design							x	x	x	x			
Project Testing										x	x		
Market Survey							x	x	x	x	x		
Analyze data												x	x

**Figure 11: FYP 1 Milestone**

#### FYP 2

Activities\Week	1	2	3	4	5	6	7	8	9	10	11	12	13
Development	x	x	x	x	x	x	x	x					
Design Interface	x	x	x										
System Function				x	x	x	x	x					
System Database						x	x	x					
System Testing									x	x			
Internal Testing									x	x			
Review complete prototype with supervisor										x	x		
Maintenance												x	x

**Figure 12: FYP 2 Milestone**

### 3.5 Application Interface

- **Splash Screen**



**Figure 13:** Splash Screen

This is the splash screen of Turbo Meal. It will display the logo of Turbo Meal during the loading time, which normally takes around 2 seconds in average.

- **Main Menu**



**Figure 14:** Main Menu

This is the main menu of the application. In this menu, there are two buttons provided which are:

1. Load QR Codes

This button is used in order to view saved QR codes after transaction. This works as a shortcut for user that normally ordered the same meal every time they go to the restaurants, so that they do not need to order again from the menu. They can simply review the saved QR code and go directly to the counter to scan.

2. Show Restaurants

The user can click this button in order to view the menu provided from each restaurants which is KFC, McDonalds and Burger King. From this button, user can proceed with their ordering.

- **Ordering Menu**



**Figure 15:** Ordering Menu

In this menu, users are provided with three tabs of the restaurants which are KFC, McDonalds and Burger King. Touching on the tabs will preview the meal available to be ordered in the selected restaurant. Each meals can be clicked to enable user to pick the meal into their shopping cart. There are 5 buttons that can be selected in this menu, which are:

1. KFC, McDonalds and Burger King button

This button when tapped will preview the meal available to be ordered from the restaurant.

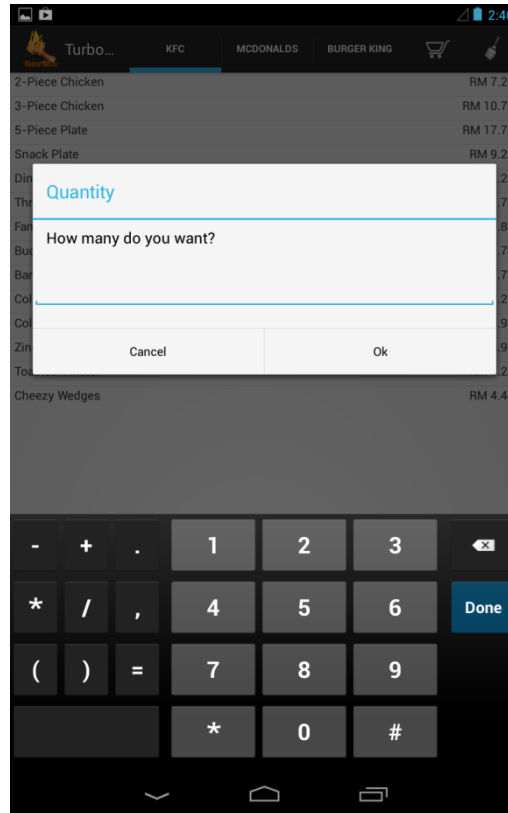
2. Shopping Cart button

The shopping cart button will show the order list that the user had generated.

### 3. Wipe Order button

This button will clear the entire order list generated by user so that they can start a new order if they wanted to.

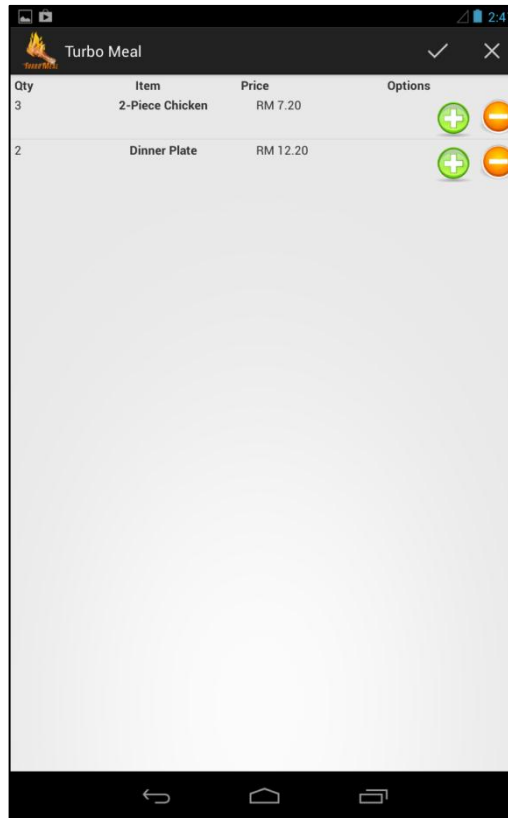
- **Quantity Popup**



**Figure 16:** Quantity Popup

This popup will be shown once user tapped on their preferred meal. It will ask the user about the quantity of the meal to be ordered and will be saved in the shopping cart.

- **Order List Screen**

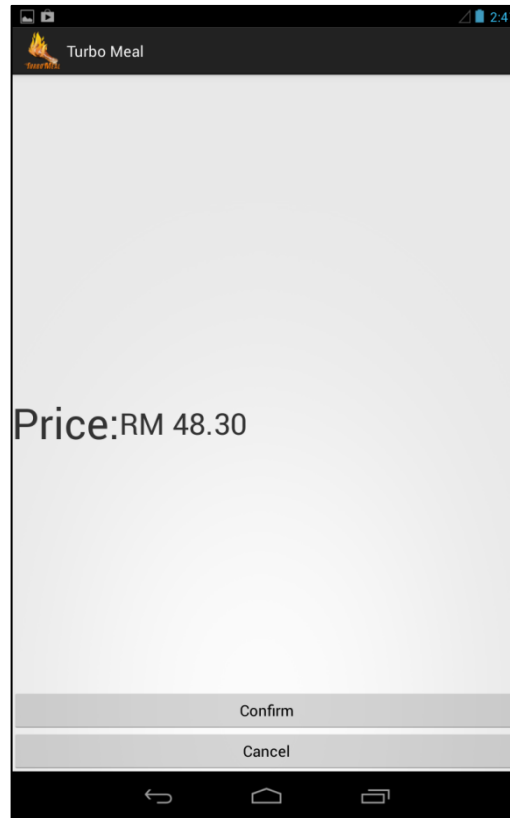


**Figure 17:** Order List

The order list will be shown once the user tapped on the shopping cart button. User can add or delete the quantity of meals that they want to order by tapping the plus and minus button on the right side of the screen.

They can proceed to the price confirmation by tapping the “tick” button. Tapping the “x” button will show a popup for deleting the entire order list.

- **Price Confirmation Screen**



**Figure 18:** Price Confirmation Screen

In this screen, user will be provided with the total amount to be paid at the counter. Tapping cancel button will bring the user back to the order list to add or delete meals. The confirm button will generate the QR code for the order.

- **QR Code Screen**



**Figure 19: QR Code Screen**

This screen will preview the QR code generated for the order. The QR code can be used to be scanned at the counter before proceeding with the payment. User are also enabled to tapped the Save button in order to save the QR code for future use.



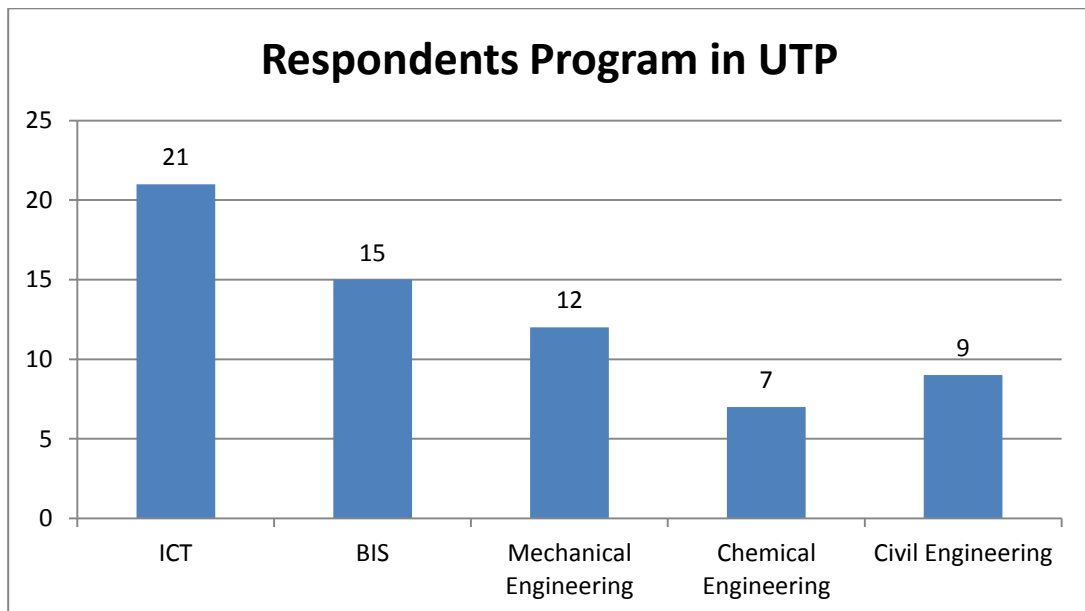
## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 Final Product Survey

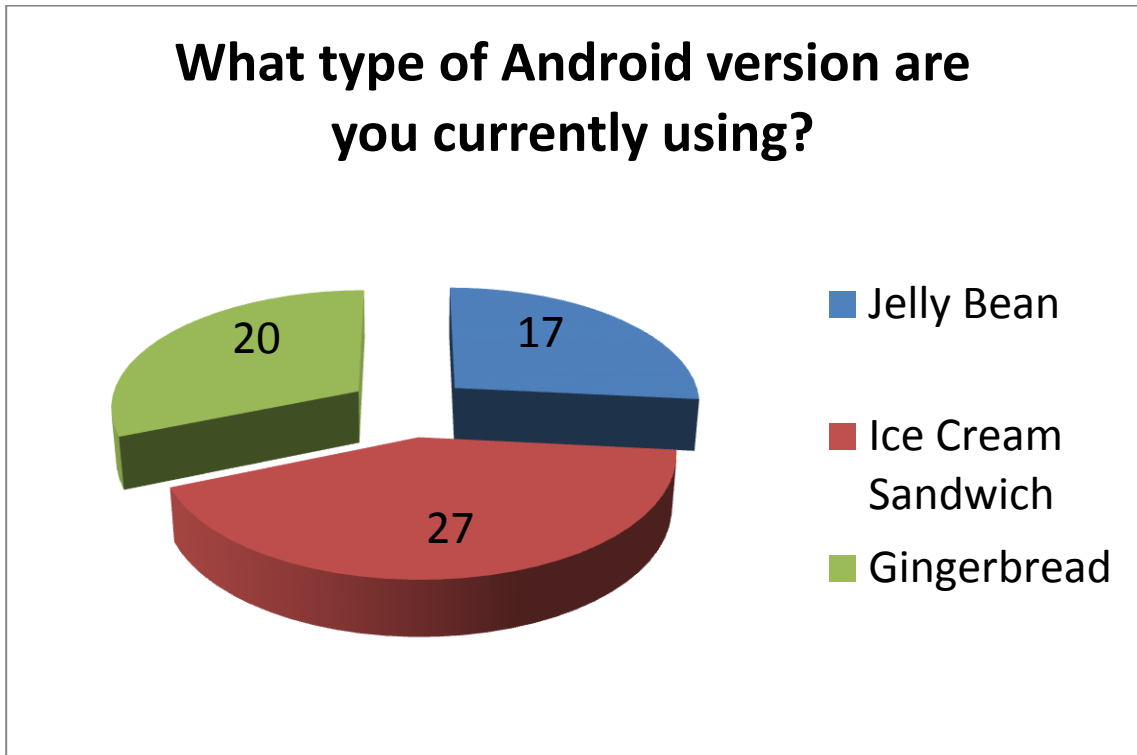
A final product survey was conducted in order to gain feedback from users on the application so that improvements can be done in the future. The survey is important in order to get the personal view from users on the application.

The survey is conducted openly to UTP students enrolled in different programs, using Android as their main OS on their phone, with the age range of 19 to 24 years old in order to gain information on relevancy of the application to them. In total, there are 64 students that participate in this survey, answering 3 simple questions that had been provided related to the application in order to gain their feedback about Turbo Meal. They are requested to test the application from an Android tablet or phone and give feedback through the survey form.



**Figure 20:** Respondents Enrolled Program Chart

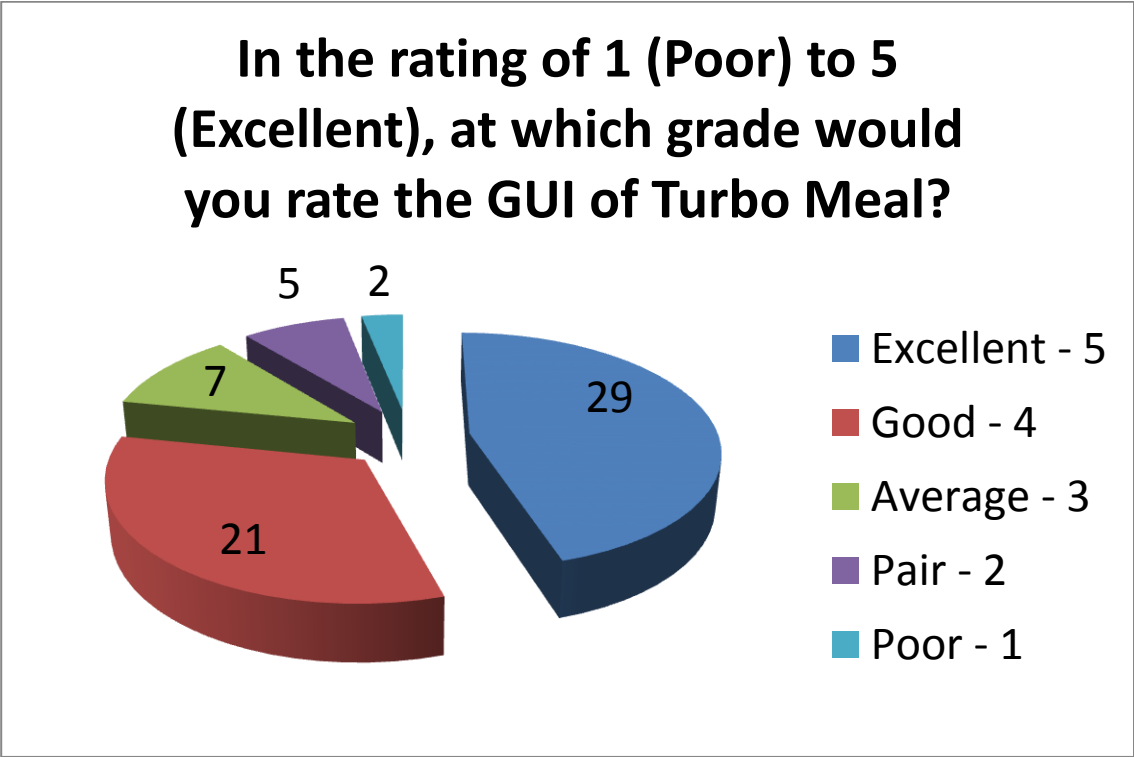
**Question 1:**



**Figure 21:** Question 1 Chart

From the first question, 17 out of 64 respondents or 26.56% are using Jelly Bean version of Android. 27 out of 64 respondents, equivalent to 42.19% are using Ice Cream Sandwich, while the other 20 respondents are using Gingerbread. This question is asked in order to test on the compatibility of the application with different types of Android versions.

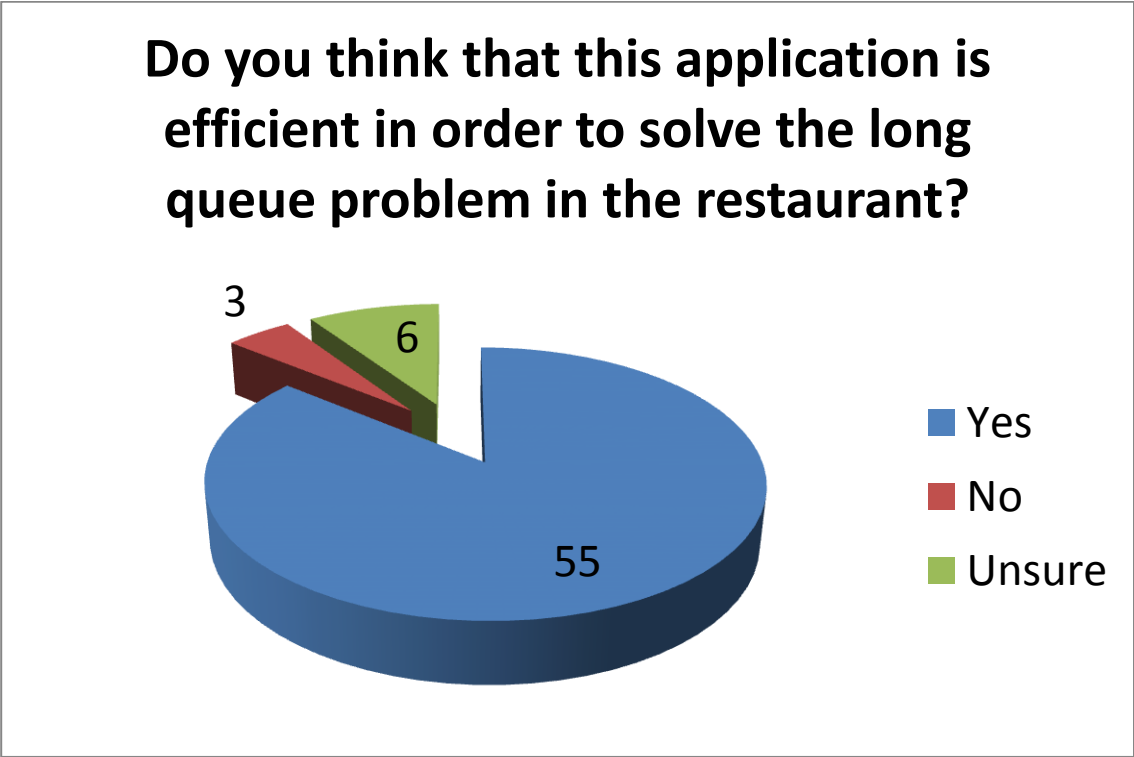
**Question 2:**



**Figure 22:** Question 2 Chart

From the second question, the respondents are asked on the quality of GUI in their point of view using their phone. A total of 57 respondents equivalent to 89.06% rate the GUI of Turbo Meal above average, which is a positive indicator of how good the GUI is. 14 respondents rated the GUI below average, and this is probably because the resolution and screen size of their device is small.

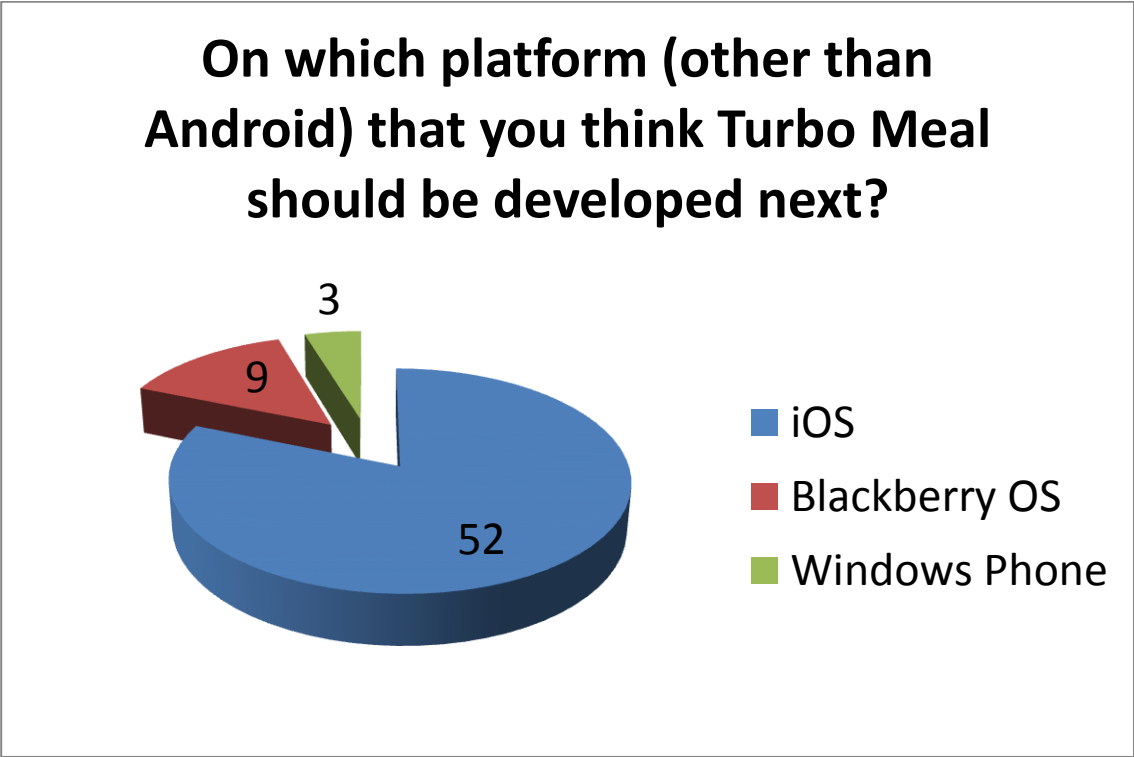
**Question 3:**



**Figure 23:** Question 3 Chart

From the third question, 55 out of 64 respondent or 85.93% believes that the application can solve the problem that currently happening in most fast food restaurants which is long queue. This question is crucial in order to show how important this application to the user in solving the long queue problem. The majority that answered yes also is a good indicator about their trust on the application.

**Question 4:**



**Figure 24:** Question 4 Chart

From this question, 52 out of 62 respondents answered iOS for the next development of Turbo Meal. This provides a clear view on which OS that Turbo Meal should be developed so that more and more user can get the ability to use this application in their everyday life.

## **Survey Conclusion**

From the survey, we can conclude that the availability of Turbo Meal is highly appreciated as it will help solve the long queue and long waiting time issue. It also might attract a good number of crowds as the number of Android users is high.

## **4.2 Future Plans**

There are a few plans that is possible to be done in order to improve and expand Turbo Meal so that it can be more useful to a bigger number of crowds. The future plans for this project are:

- Implement the application on iOS, Blackberry and Windows Phone platform.
- Enable digital payment and online payment.
- Provide nearest fast food restaurant finder using GPS.

## **CHAPTER 5**

### **RECOMMENDATIONS AND CONCLUSION**

There are several recommendations that can be made to this project. Recommendations are not meant to be used to change this project wholly, but to allow improvements in certain areas of the project and to put some factors into considerations before proceeding with the development of the software.

One of the recommendations is that users can use the QR code scanning method to pay for their meals. Besides that, in order to complete the project early and more effective, the development phase need to be done within the time frame as what has been planned. The menu provided in the application can also be modified in the future to be connected to the fast-food company's server in order to serve an up to date menu to the user. Moreover, this project can be expanded in other platform such as Windows Phone and iOS to cater the needs of various users that uses different operating system on their phone or tablet.

As a conclusion, this project will be a good project for fast-food enthusiast and help citizens of Malaysia to live efficiently without wasting time. This new alternative of buying meals from fast-food restaurant will indeed improve users approach in their lifestyle and also provide an easier way to order their meal instead of using the current traditional way of waiting line. This application are hoped to become a trend among android users and be widely used in their everyday life.

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# APPENDIX

## Survey Form Sample

### Meal Ordering Application (Turbo Meal) Survey Form

Age: .....

Gender (M/F): .....

Year: .....

Program: .....

For the following questions, please tick (√) in the box provided.

1. What type of Android version are you currently using?

Jelly Bean   
Ice Cream Sandwich   
Gingerbread

2. In the rating of 1 (Poor) to 5 (Excellent), what would you rate the GUI of Turbo Meal?

1 2 3 4 5

3. Do you think that this application is efficient in order to solve the long queue problem in the restaurant?

Yes   
No

4. On which platform (other than Android) that you think Turbo Meal should be developed next?

iOS   
BlackBerry   
Windows Phone