Food for You (F4U) Mobile Charity Application

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Abstract

The Food for You (F4U) mobile charity application has been developed with objective to ease the burden of impecunious peoples, who need foods to continue living. Simultaneously, the application is also beneficial in reducing the food waste problem. While there exists a few of mobile charity applications, none of them provides connections between the needy, donators and food suppliers as to resolve the food waste problem. This paper provides a features comparison study among several charity mobile applications, defining the limitation of the application and introduces the F4U mobile charity application. The system flow and general architecture are also described in this paper, including the usability test of the system. Results from the usability study has indicated that the system is easy to use and able to decrease 49% of food waste at the selected testing area.

Keywords: Mobile application, food waste problem, donators, charity.

1. Introduction

Mobile application has been very popular and used for a various purpose in human life including in health, safety and security, education, food, travel and others[1][2][3][4]. Currently, the trending of people downloading and using the mobile application is increasing. Globally, there are many types of mobile applications have been developed for charity purposes including charity mobile application for Non-Governmental Organization (NGO) that focused on various aspect in life such as a charity for the animal, environmental, disaster relief, food surplus and poverty purposes[5][6].

The current issue in the mobile charity applications for food surplus and poverty is the lack of connection between the needy, the donators and the food suppliers. The connection between them is important as it will sustain the users to use the mobile charity application for a long time to decrease the number of poverty and food waste as well. Although there exist a few numbers of mobile charity application but all of them only focused on poverty and hunger issues. The application has been designed without the food supplier's information and therefore could not resolve the food waste problem. While there are many organizations and public sectors as well as NGO strategized actions and campaigns to reduce food waste, the problem still appear and never been resolved. Regarding poverty, currently the rate of poverty in global level is declining year by year but the issue is due to poverty people can become homeless and lack of food supply because they have insufficient or probably no income at all to buy food. Food is a basic living needs because it is necessary for living, without food people can die due to hunger and lack of vitamin and nutrition. This issue becoming more crucial when it involves children because kids do not have an income. Furthermore, it is proven from past research that a poverty will lead to crime. Responding to that problems, a mobile application for charity, named as the Food for You (F4U) is developed.

2. Research Background

This part describes issues in poverty and food waste as well as the existing mobile applications for the issues.

2.1 Poverty and food waste

Poverty is one of the biggest global issues and happen in every country of the world. Generally, poverty is basically referred to as failed income "dollar-a-day" by World Bank [7]. Reported in [8] about poverty status in Malaysia, there is a significate decreasing rate from as high as nearly 50% in 1970s to below 2% in 2015. However, the researchers found that some states still experience high poverty rates such as Terengganu and Kelantan.

Food waste is an extensive segment of the world's food system challenges. Wasted food can be depicted as all edible food materials produced for human utilization however left uneaten, either lost or disposed of all through the food supply chain, from farm to fork. It is natural waste released from different sources including food processing plants and handling plants, and local or commercial kitchens, cafeterias and restaurants [9].

Food waste is perceived to be an enormous issue around the world, and severe condition in developed countries. It is one of a global issue that faced by every country worldwide. It may seem like not important cases for people to concern but when it related to the poverty and hunger to those who need a food, it is a big issue that needs to be considered. For cases, in the United States, food waste and losses at the consumer levels and retail have added up to 188 kg per capita every year, or a general estimation of \$165.6 billion. Among Europe and the North America, the food waste was assessed as high as 280 – 300 kg for per capita every year [10]. It is evaluated that 33% of food waste in the Southeast Asia [11].

2.2 Charity Mobile Applications

A very limited application has been reported in a form of journal or proceeding with regards to mobile applications for charity activities. Nevertheless, some applications are available to be used online or in mobile platforms such as Share The Meal at https://angel.co/sharethemeal-1/jobshttps://www.myfood4you.com,Olio at https://olioex.com, Lunch Box at https://www.universitylunchbox.com/ and Charity Box at http://www.getcharitybox.com/. Table 1 lists the features comparison of the applications.

Table 1: Function comparision of Charity Mobile Applications

Function	Share The Meal	Olio	Lunch Box	Charity Box
Free food	./	/	/	X
Chatting among users (needy)	X	/	X	X
Location aware	X	/	X	X
Money donation	/	X	X	/
Food supplier	X	X	X	/

Share The Meal, Olio and Lunch Box supports services for food charity while Charity Box focuses on money charity. Only the Share The Meal that support both food and Money donation. Only the Olio that provides location maps for the users. In the F4U mobile applications, the inclusion of all functions listed in the Table 1 has been the concern of development.

3. System Design and Architecture

3.1 Functional Requirement

In general, the fundamental function that should be provided by the mobile application are:
- Allow users to register either as a needy, donator,and supplier
- Allow users to login into the system
- Allow users to view their profile and make changes for their account profile
- Give users maps overview that shows the availability of free food from donator, selling food from supplier and request food from needy with each of it shown by a marker on the maps with different colors.

- Allow user who registers as needy to request food and take free food that available from the maps
- Allow users who register as a donator to donate food, money, and services to those needy who do not have access to this application and buying food from the supplier and donate them to needy
- Allow users who register as a supplier to donate food, money and selling food to avoid food wastage
- Allow supplier to move their nearly expired items from their inventory system to the application so that they can choose easily which item to be sold
- Allow users to view bulletin news (e.g. top donators, contribution in any charity project etc.)
- Allow application to access WhatsApp chat application if the users want to communicate
- Allow application to access Waze or Google Maps navigation apps to give direction for users to pick up or deliver foods

3.2 Users of the mobile application

F4U mobile application has three type of users, which are needy, donator and food supplier. The donator could be anyone that generous to do the charity whether to donate their money or food. The suppliers are all the peoples or organizations that want to sell food for the donators. This system connects all the users on the same platform that allow them to easily interact or communicate with each other. Needy users can choose and can make requests for food given by donators nearby their location. The donator users are facilitated with functions to donate food, money and services

to those needy. Furthermore, users from supplier category are provided with functions of sell food and managing foods' transfer. All users can track the donation and business transaction status as well as the delivery status. There are listed Charity Nongovernment Organization so that people can donate money to the organization by using this system. Through this mobile application, they also can view the news related to charity, donation and the application itself.

The sequence diagram depicted in Figure 1 shows the object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario for this system. In this sequence diagram, it shows the time taken by the user of the apps started from login to the apps until they logout from the apps.

An activity diagram is a graphical representation of an executed set of procedural system activities in the mobile. Activity diagrams describe parallel and conditional of various activities, use cases and system functions at a detailed level. Figure 2 presents the activity diagram.

Fig. 1: Sequence Diagram of the System

Fig. 2: Activity Diagram

3.3 System architecture

Food for You (F4U) mobile application developed using the Ionic 3 and Angular 5 tools as depicted in Figure 3.
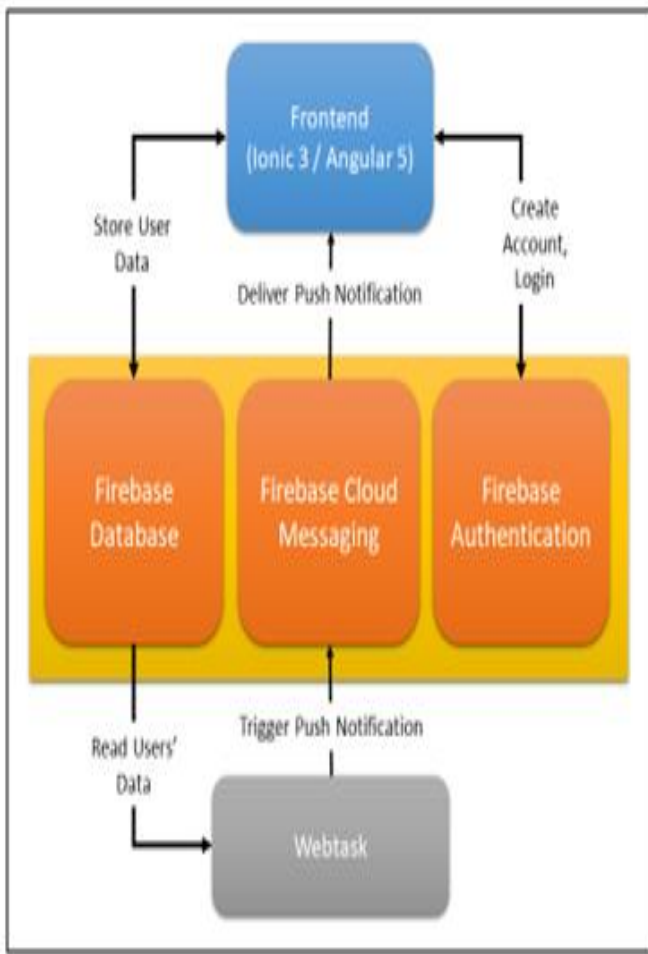

Fig. 3: System Architecture

Ionic 3 has connection with Firebase software framework[12] provided by Google with three important elements namely Firebase Database, Firebase Cloud Messaging, and Firebase Authentication.

The Firebase database store the user's dataset and profiles and all the activities run by the user when using the application. At the backend of the Firebase, there is a webtask.io that function as a service platform to update data at the database and synchronize it to clients. All the real-time activities done by the users such as request donate or selling food, the Web task are responsible to trigger the notification to the Firebase Cloud Messaging. The Firebase Cloud Messaging then push notifications to the related users. Firebase authentication manages the creation and verification of users by creating a unique key ID for every user.

3.4 The interfaces

The following figure 4 to present some of the F4U interfaces. Figure 4 allows users to choose their category then the user login page will be appeared on screen. Figure 5 is the sign-up and user profile entry pages if the users do not have any account yet in the system. Figure 6 is the main pages for all users either to search for free food by needy, donate money by donator or food and selling food by supplier. Users can access the details of each users by clicking at each GPS position, that marks with three different colors. Red icon to represent needy users, green as the donator and yellow as the supplier.
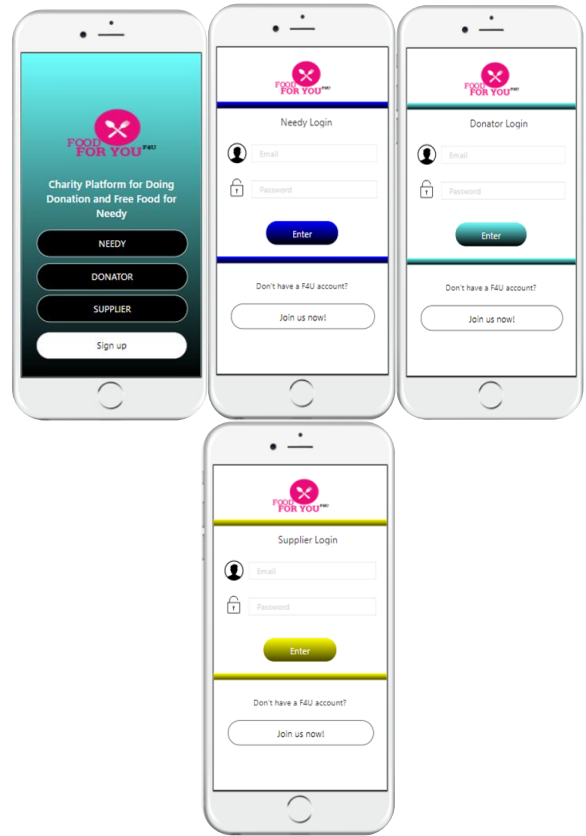
Fig. 4: Users specification page
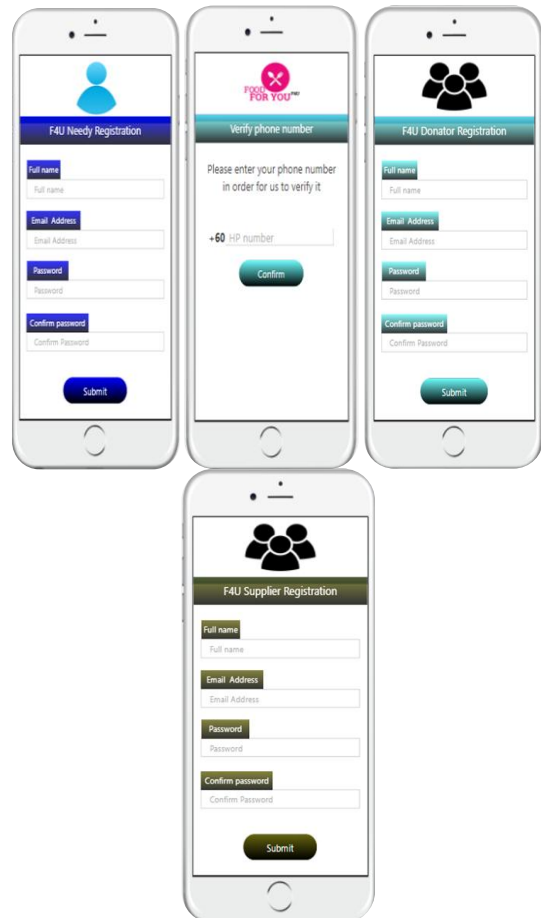
Fig. 5: Users registration pages

Fig. 6: Needy, Donator and Supplier main pages

4. Results

4.1 Effectiveness Test

To measure the effectiveness of F4U Mobile Charity Application, several tests have been conducted. A set of data were collected from café V1, V2, V3, V4, V5, V6, Pocket D and Pocket C at University Technology of Petronas that located in Seri Iskandar. The sample of the user consists of 100 peoples, including students and worker from various villages, background of studies and families. The data for all the unsold food at the café are measured by meal and pounds. Data were collected for 42 days that exclude Saturday and Sunday as many cafes are closing on these days. The total measured of food waste before and after using the system was compared (first 21 days with normal operation, next 21 days with F4U application).

For the first 21days, there exists 841 meals of food waste at those cafes, which is equivalent 1009.2 lbs. or 0.00045 tones. According to the United States Department of Agriculture defines a meal as

1.2 pounds of food. The numbers were able to be decreased when the users used the F4U application. For the next 21 days, the total measured of food waste is 427 meals. This is equivalent to 512.4 lbs. or 0.2306 tones. Therefore, almost half percent of decrement (49%) occurs from the F4U application when used at the selected testing area.

However, this result cannot be describing or equalize to the world problems since the sampling number is totally small amount if compared to the world's population. Factors that contributed to the high decreasing of the food wastage within this area probably due to:

- There is a user who has personal income that contributes as a donator buying the food form the cafes to donate it.

- The user within this area realizes that even the needy in this area is the students of the private university but everyone has their own problems and comes from different families' background and level incomes.

- People aware of the benefits of this mobile application and are interested to contribute.

- People in this area are highly generous attitude and feeling easy to make a donation using this platform encourage them to contribute.

4.2 Usability Test

Users have been asked to get their feedback on the level of the difficulty to use important function in the F4U mobile application. The difficulty level is measured based on Likert scale 1-no difficult, 2-less difficult, 3-moderate difficult, 4-difficult and 5-very

difficult. Results showed that all the functions are easy to be used by all the users with average less than 3 for all functions asked in the questionnaires form such as search, sell, donate, locate, find location and cancel processes.

5. Conclusion

Peoples use mobile application for various purposes and the trend is increasing from year to year. Therefore, F4U mobile application has the potential to get a huge number of users and thus beneficial to resolving the poverty, hunger, and food waste global issues. Furthermore, with the Firebase software framework used to develop the F4U application, some enhancements are possible to be done to increase the F4U functions such as to include google analytic for all the users, bulletin news and campaigns. The ideas presented in this paper related to the system design, architecture and testing is beneficial for researchers who intend to develop another kinds of mobile applications[13][14][15].

Acknowledgment

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