

Towards Achieving Zero Hunger Among UUM Community via Smart Food Bank Application

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DOI: <https://doi.org/10.30880/mari.2023.04.01.030>

Received 15 October 2022; Accepted 30 November 2022; Available online 15 January 2023

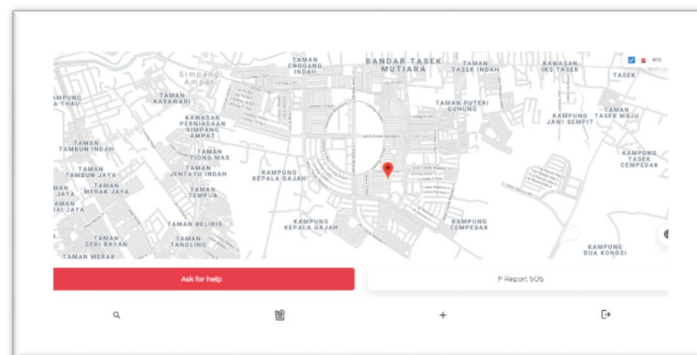
Abstract : The Student's Food Bank at Universiti Utara Malaysia has been launched in September 2019. It is officiated by His Majesty the Sultan of Kedah. It is operated manually. Due to the large number of donations received, it is difficult to run the food bank effectively, especially when it comes to helping students who are truly in need. A smart food bank application is created and developed in a mobile environment and operates on the Android platform with the goal of having an effective management of the food bank in order to achieve zero hunger in the UUM community. A smart food bank application is created and developed in a mobile environment and operates on the Android platform with the goal of having an effective management of the food bank in order to achieve zero hunger in the UUM community. The management of food stock, food allocation, food application, food contributions, as well as the management of registered users, are the primary functions included in the application. Users of the application can check the status of their applications and request food by sharing their location on the UUM map. By indicating their preferred place for the administrator to pick them up, potential donors can provide their donation. All tasks are created to make it easier for these three key partners to administer the UUM food bank better. The project supports the Sustainable Development Goals' (SDG) second and third objectives, which are respectively to end hunger and promote health and well-being. It can act as a platform for giving the UUM community healthy meals so that the desired SDG targets can be met. This innovative food bank application is believed to be able to help organize a proper food distribution programme for the UUM community's less fortunate members, which could eventually improve the students' quality of life. The smart food bank application can be extended to additional food bank facilities or comparable organisations providing the same services in order to achieve zero hunger in a larger context due to its good findings, feedback, and impacts.

Keywords: food survival, food bank, zero hunger

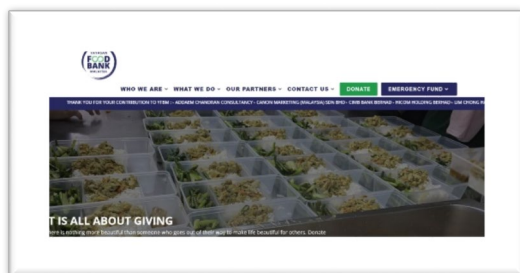
1. Introduction

Due to COVID-19 pandemic, many are affected economically. The most affected group is the B40 group [1]. They cannot afford living expenses because unemployment directly cuts off their financial resources [2]. At this time, many governments or non-governmental organizations took the initiative to start food banks to help people in need. As food is one of the indispensable necessities of people, because people need to convert food into energy to survive, so it has become the most basic need of people [3]. However, some people are unable to get enough food for many reasons, such as poverty, which makes them hungry more severely, which can lead to health problems and even death. For example, single-parent families cannot afford family expenses because they have only a meager income [4].

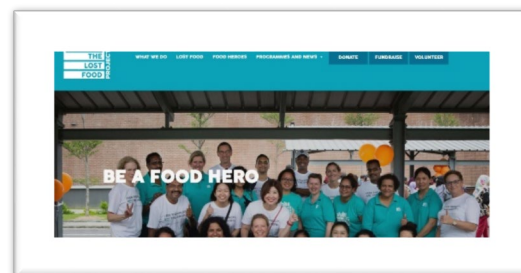
There are some similar food bank projects that have been developed namely Sambal Sos, Yayasan Food Bank Malaysia and The Lost Food Project. Main interfaces of the three similar projects are shown in **Figure 1**. Sambal Sos is a web-based application (the original name is known as Bendera Putih). This application is created by a group of Malaysian students with the purpose of helping people to find food by indicating *white flag locations*. Assistance will be sent to the shared address accordingly. Target users for this application is all Malaysian who are in need. The interface of this application looks very simple and tidy. Its unctions are clearly presented and easy to recognize. However, the weakness of this application is that there is no user guide to guide new users to use this application. The coverage of target users are too large which may cause difficulty to those in remote areas.



(a)



(b)



(c)

Figure 1: Main interfaces of similar food bank projects

The second project is a website created by Yayasan Food Bank Malaysia (as illustrated in Figure 1b). This organization was established in 2019 and is a non-profit non-governmental organization. They distribute food to B40 community of Higher Education Institutions (IPT), Charity Homes, Welfare Centers, and *Program Perumahan Rakyat Termiskin* (PPRT). However, its weakness is aimed at new users. Due to the complex structure of this website, it is not convenient for users to use, difficult, and not user friendly. Another similar project is named as The Lost Food Project (as illustrated in Figure 1c).

The Lost Food Project is also a non-profit non-governmental organization. This organization distributes *lost food* (or also known as surplus food production) food to those in need, including charity partners, B40 families, refugees and vulnerable communities. On this website, users can register as volunteers, fundraising partners, or promise monthly or one-time donations. The interface of this website looks nice and attractive. However, the disadvantage of this website is that the layout design is unbalanced. Some of the screens and left blank.

The similar are developed on a web-based basis, and there is a lack of mobile-based applications in the market. The applications have their own characteristics, but all have some shortcomings, such as lack of user guides, excessive target users, complexity, not user-friendly and unbalanced layout design. Based on the above shortcomings may lead to the loss of users.

Universiti Utara Malaysia also took the initiative to help its students who are in need by setting up a food bank and played a very important role in assisting students. Due to the excessive demand that the traditional manual approach cannot cope with, the management of UUM Food Bank needs to be automated by designing and developing a mobile application of UUM Smart Food Bank in ensuring smooth and effective management of the food bank which currently managed manually.

2. Methodology

There are five main phases of developing UUM Smart Food Bank application as illustrated in **Figure 2**.

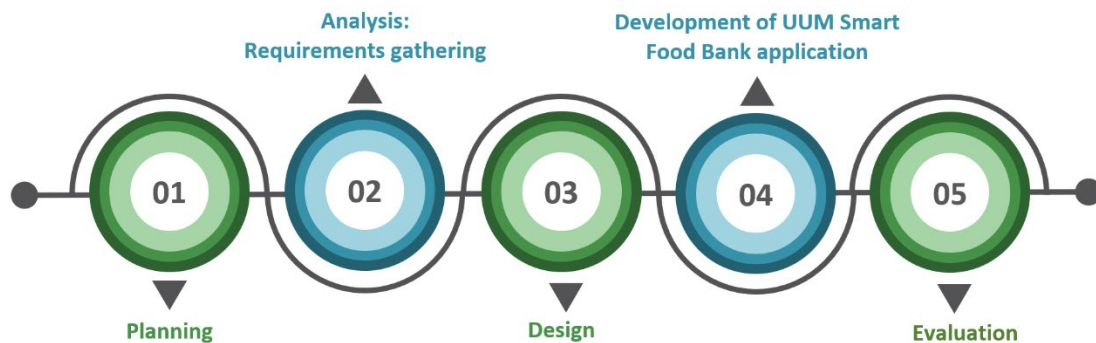


Figure 2: Project Methodology

2.1 Project planning

This is where the initial idea of the UUM Smart Food Bank (mobile application) is started. The planning phase focuses on identifying the problems managing UUM Food Bank which led to the idea of developing this project. Planning phase also focused on reviewing similar applications for food banks to give basic ideas in designing and developing our proposed mobile application.

2.2 Requirement gathering and analysis

Requirement gathering process have been carried out in two sessions involving potential users of UUM Smart Food Bank application. The first session was conducted on 15 December 2021 involving admin category among SSSD staff. A second session was conducted on 22 December 2021 involving potential applicant and donor category. The respondents were actively involved during the construction (development) phase, where the initial draft of interface is used to give them brief idea of the application. Based on the sessions, 13 significant requirements (and their priority) produced as depicted in **Table 1**. The requirements include; Sign Up, Log In, Manage User Details, Donate Food, Daily

Necessities or Cash, Apply Food, Daily Necessities, Cash or Voucher Assistance, Manage Stock, Manage Allocation, Manage Application, Manage Donor, Report Issues, Manage Language, Send Notification and View Help Desk.

Table 1: Functional requirements of UUM Smart Food Bank Application

Requirement ID	Requirements Description	Priority
USFB_01	Sign Up	
USFB_01_01	Register a new account	M
USFB_01_02	Choose local or international student.	M
USFB_02	Log In	
USFB_02_01	Log in to the system	M
USFB_02_02	Reset password by inserting the correct OTP code that is sent to email.	M
USFB_02_03	Select "Remember Me" to remember user's login information.	D
USFB_03	Manage User Details	
USFB_03_01	Users can update user details	O
USFB_04	Donate Food, Daily Necessities or Cash	
USFB_04_01	Donors enter details info	M
USFB_04_02	Donors choose donation items	M
USFB_04_03	Donors check the bank account of the management	M
USFB_04_04	Donors link FPX and online banking	D
USFB_04_05	Donors choose to get the current location or enter the location	M
USFB_04_06	Donors set the delivery time	D
USFB_04_07	Donors view the list of donations.	D
USFB_04_08	Donors edit information of donation.	D
USFB_04_09	Donors cancel the donation.	D
USFB_05	Apply Food, Daily Necessities, Cash or Voucher Assistance	
USFB_05_01	Applicants view allocation list.	M
USFB_05_02	Applicants enter matric number, IC number and family income when applying for assistance.	M
USFB_05_03	Applicants enter reasons for applying food.	M
USFB_05_04	Applicants choose categories of assistance	O
USFB_05_05	Applicants choose to apply for themselves or others.	M
USFB_05_06	Applicants choose to get the current location obtained by the system or enter the location by themselves.	M
USFB_05_07	Applicants enter other person's information	M
USFB_05_08	Students choose options for allergies, health, vegetarians or other issues.	M
USFB_05_09	Students can view the status of the request.	M
USFB_05_10	Students can edit the request before the item is sent.	M
USFB_05_11	Students can cancel the request.	M
USFB_05_12	Staffs can help students apply for assistance.	D
USFB_06	Manage Stock	

USFB_06_01	Staffs can add stock and its information	M
USFB_06_02	Staffs can view list of stock and its information	M
USFB_06_03	Staffs can edit stock information	M
USFB_06_04	Staffs can delete stock information.	M
USFB_07	Manage Allocation	
USFB_07_01	Staffs create a table for students as records	M
USFB_07_02	Staffs edit the allocation table.	D
USFB_07_03	Delete record from allocation table.	D
USFB_07_04	View allocation history	O
USFB_08	Manage Application	
USFB_08_01	View list of applications.	M
USFB_08_02	View applicants list	M
USFB_08_03	Approve applications	M
USFB_08_04	Reject applications	M
USFB_09	Manage Donor	
USFB_09_01	View the list of donors.	M
USFB_09_02	View list of donation items	M
USFB_09_03	View donors' information	M
USFB_09_04	Approve donors.	M
USFB_09_05	Reject donors.	M
USFB_10	Report Issues	
USFB_10_01	Students and donors can report issue	D
USFB_11	Manage Language	
USFB_11_01	Users can change language	M
USFB_12	Send Notification	
USFB_12_01	Send notifications about expiration dates.	M
USFB_13	View Help Desk	
USFB_13_01	View admin's contact information	M
USFB_13_02	View guideline.	D
USFB_13_03	View the frequently asked questions.	O

2.3 Design

Based on the gathered requirements, the structural components of the mobile application are designed and modelled. Unified Modelling Language (UML) is used to visualize and model the requirements. One example of the diagram is use case diagram showing behavioural interactions of users and use cases involved as illustrated in **Figure 3**.

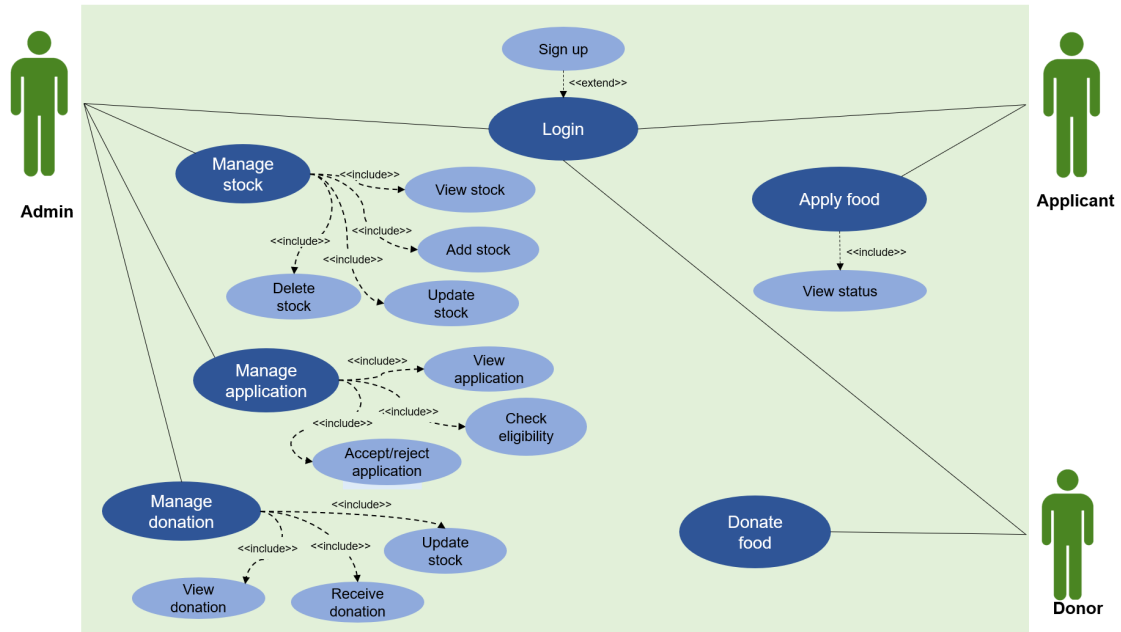


Figure 3: Use case of UUM Smart Food Bank

2.4 Development of UUM Smart Food Bank application

The design of UUM Smart Food Bank is then translated into a workable application by using Flutter. Visual Studio Code was used as the main integrated development environment (IDE) tool. The cPanel web server as a development platform was used to facilitate crucial functions like user authentication and database storage. Figure 4 illustrated selected interfaces of UUM Smart Food Bank application, which showing a landing screen in Figure 4a, five main functions in Figure 4b, and location sharing page in Figure 4c.

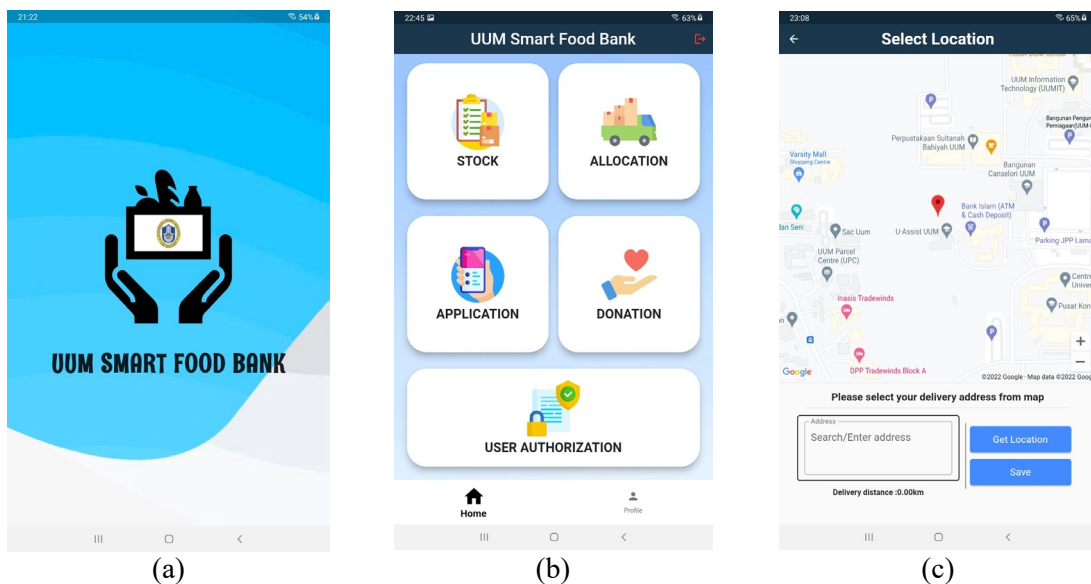


Figure 4: Selected interfaces of UUM Smart Food Bank

2.5 Evaluation

UUM Smart Food Bank application has been evaluated in two sessions involving 31 testers who are the same individuals involved during requirement gathering sessions. They are seven Admin, 19 Applicants, and five Donors. The sessions were conducted five months after requirement gathering sessions, which are on 9 May 2022 and 22 May 2022 involving Admin group and potential applicants and donors respectively. Prior user test, a demo of UUM Smart Food Bank application has been conducted followed by user experience sessions where users are given chance to experience using and exploring the application. Self-guided test has been conducted at the end of the sessions.

3. Discussion

There are six evaluation components have been included in the test. However, this article focused on three components which are satisfaction, effectiveness, and usefulness towards UUM Smart Food Bank. Each component has three, four, and four items respectively. Mean scores for each item are depicted in **Figure 5**.

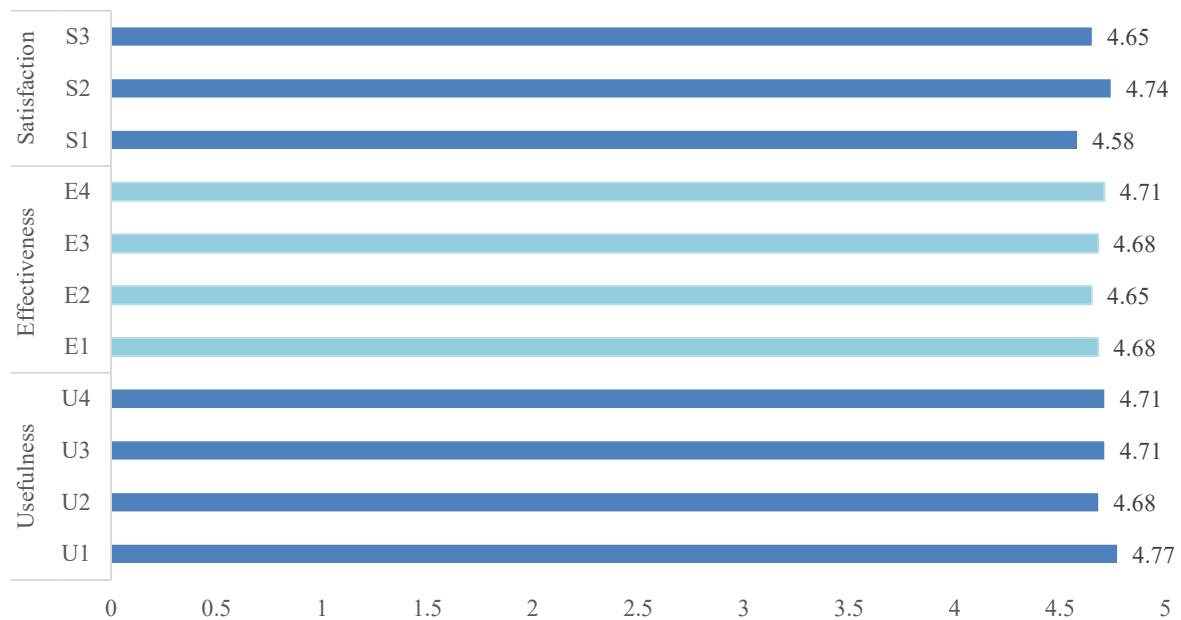


Figure 5: Evaluation results

In general, the value of mean score for all items are high with minimum value of 4.58 and maximum of 4.77 which conclude that testers are satisfied with the application. The results also indicate that the application is effective and useful serving its proposed functions. Despite its success, there are rooms for improvement in producing a better version of the application. Eleven suggestions have been received by the testers to improve the functions for UUM Smart Food Bank, the flow, design and layout, as well as suggestion location of stock. Detail suggestions are illustrated in **Figure 6**.



Figure 6: Suggestions for the improvement of UUM Smart Food Bank application

4. Conclusion

UUM Smart Food Bank application is believed to be beneficial to many parties particularly the admin of UUM Food Bank and UUM community in general. Systematic and efficient management of UUM Food Bank will be the main benefits. More potential applicants can be reached and helped. This application is significant towards achieving SDG Goals 2 (Zero hunger) and Goal 3 (Good health and well-being) among UUM community.

Acknowledgement

This research is funded by Universiti Utara Malaysia (UUM) through Graduate Development Research Grant (GraD 2021-21098). Authors fully acknowledged UUM for the approved fund which makes this important research viable and effective.

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