

ADAPTATION OF A PUSH NOTIFICATION TO OPTIMIZE HOME-BASED BUSINESS ORDERING SYSTEM

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Abstract: *Home-based business has become a significant business trend in recent years. But there are also challenges. One challenge is the need to handle orders efficiently. There are owners who take orders manually. This poses difficulties to manage orders efficiently and it is prone to order errors. Thus, a new method is needed to assist home-based business owners managing orders better. This study proposed a mobile application that allows order taking with the adaptation of a push notification feature. The application was developed using the Modified Waterfall methodology and used the requirement gathering and analysis, design, implementation and testing phases only. The platform is Android Studio with Java as a language and connect to Firebase as database. Functional testing results showed that the functions worked correctly. Therefore, the mobile application shows potential to help the business owners to handle orders more systematically.*

Keywords: *home-based business, mobile application, push notification*

Introduction

The dynamics of entrepreneurial methods or processes, entrepreneurial practices and how entrepreneurship is done were modified by digital technologies (Nambisan, 2017). Digital technologies allow the home to become a place or space for entrepreneurship. There are two types of home-based businesses which are those that carry out any or all of their operations in the private home and those that work from home, but a more significant part of their activities are carried out either on the premises of the customer or on outside or outdoor sites (Reuschke & Domecka, 2019).

Benefits for operating a business from home are cost-minimisation, the nature of the business which does not require commercial premises, flexible working hours and convenience from the view of a home-based business owner (Zainul, 2020).

Despite the advantages of home-based business, it also can pose challenges. As the number of customers and orders are growing, sellers can face difficulties in the process of managing orders and the delivery if they do not have a systematic way to do it. According to (Zainul, 2020), sellers can misplace orders and confuse the delivery to customers. Moreover, many sellers of homemade food products take orders through social media platforms such as a direct message on Instagram, Facebook and WhatsApp. The orders are recorded using pen and paper. Using pen, paper and many platforms for taking orders can allow the seller to make order and delivery errors. Sellers can forget about the delivery to the customer. The mistakes can cost them to lose loyal customers as well as potential ones if the service continues to be poor to customers.

Receiving bad reviews from customers is not good for growing business. Digital technologies allow the home to become a place or space for entrepreneurship (Kraus et al., 2019). Digital entrepreneurship is reshaping conventional approaches to exploring entrepreneurial opportunities and developing innovative ways of generating and doing business.

Based on the problems mentioned above, there is a necessity to assist home-based business sellers to handle the process of managing orders in an organized manner and for customers to have an error-free order process. Thus, this paper proposes a mobile application as one platform for customers to place orders easily and sellers to receive orders in an organized manner. The application also provides a push notification feature to enhance the efficiency of the order taking and delivery of the product to the customers. The notification is to alert sellers when there are orders from customers, to alert customers on their order status, to alert sellers on the delivery dates and to alert sellers when customers upload payment.

Literature Review

Home Based Business

In a wide variety of countries, the home-based business market has gotten a lot of coverage (Nathan et al., 2019). For example, such as Malaysia, Japan, Singapore, Australia, USA, Netherlands and New Zealand. Cost-cutting, the essence of the business, which does not require commercial facilities, and flexibility are the three key factors for running a business from home (Williams et al., 2012). The home-based business is a form of business that may be run in a variety of industries, including manufacturing, tourism, the arts, and education (Sulaiman et al., 2012). Even though this is a small-scale business, with the correct strategy and technology, it has the potential to develop and flourish in that industry.

Digital Technology

The use of digital technology has resulted in more fluid and less constrained entrepreneurial operations and results (Nambisan, 2017). Many of the drawbacks of running a business from homes, such as physical space and visibility, are gone thanks to digital technology.

Mobile Application

Smartphones or tablets have an application that runs on a mobile device that is called a mobile application (Phongtraychack et al., 2018). This has occurred because of innovations and improvement in technology around the world. Mobile applications are in line with developments of media, information and technology. Usually, mobile applications need an intention or purpose to develop an application. A lot of users and a mobile application that are user-friendly can be considered as a goal of the developer for their mobile application.

Mobile Application for Ordering Food

In Malaysia, the food delivery service industry is growing and has a high potential rate. Consumers are asking to get takeout food delivered in conjunction with government standard protocol in the Covid-19 pandemic with social distancing as a new norm (Nayan & Hassan, 2020). According to (Anwar et al., 2020), the advancement of android innovation on mobile devices make an individuals' lives become more effective and efficient. Android innovation will likewise be a significant point in assisting with food without shopping out of the house. There are many kinds of mobile applications that are installed on a mobile device, such as calendars, services, gaming, board sports, medical and health, and some more. There are some cases of individuals who tend not to figure out how to get in and out things, especially food. Nowadays, food delivery service is high on demand, especially for students (Anwar et al., 2020). Food delivery and other services are really important for them.

Push Notification

Push notification is the basic tool to improve user's levels of consistency and involvement with apps that can also provide a reminder or up-to-date information to users even if the application on a mobile device is not running (Isikligil et al., 2017). Push notifications are a great tool to deliver messages to the user that will enhance brand attachment. On the other hand, timing of message delivery is inappropriate, content is unsuitable or frequency of messaging is high can make the user feel uncomfortable, annoying, unwelcome, thus decreasing brand attachment (Gavilan et al., 2022). Push notification (PN) processes can be used to send automatic notifications to members in order to encourage continued interactions and result in more student engagement (Garbrick et al., 2018). For frequent patient communications, Rehab Tracker employs automated push notifications to remind and encourage to complete neuromuscular electrical stimulation (NMES) sessions frequently, but not so much that non-compliant patients begin to ignore the notifications (Stevens et al., 2019).

Methodology

The Modified Waterfall model was used as a Software Development Life Cycle (SDLC) approach for mobile application development in this project. The classic waterfall model had the disadvantage that if error occurred at early phases, it could only be found at the final phase. There is no choice or option for returning after moving to the following phase (Rani et al., 2017). For the waterfall model, the following stage is dependence based on the result of the past phase. It is basic and simple to understand. To eliminate this difficulty, numerous progressions are made to the model, and the modified waterfall model will be implemented in this project.

Different modifications have given various options to the developer to come back to the past phase or to the beginning phase (Sridhar et al., 2015).

The following subsections describe the flow in implementing the proposed idea: requirement gathering and analysis, system use case, system flowchart, implementation and functionality testing.

Requirement Gathering and Analysis

An open-ended interview was conducted to the owner of a home-based entrepreneur that sells homemade food and one customer of the business separately. 10 questions were constructed for the seller while 7 questions were for the customer. The response from the seller and the customer to each question respectively was analysed and the findings were used as the requirements for the application. Table I shows the identified priority requirements and main use cases.

Table 1: Identified Problems, Requirements And Use Case

| No | Problem | Requirement | Use Case |
|----|---|--|---|
| 1. | The orders of cookies that was received from customer through multiple social media platforms such as a direct message on Instagram, Facebook and also WhatsApp makes too much for Mr. Zaimul to handle all the tasks including buying the ingredients, taking orders and managing the delivery details alone. Orders missing, duplicates and wrong order sent to the customers and at times the orders are sent out late for delivery. | <ul style="list-style-type: none"> Developed a mobile application as the only platform to received orders from customer. Customer can make order. | <ul style="list-style-type: none"> Add to cart |
| 2. | The order's details need to be search and find from the record of order on a paper. Sometimes, it will take some time because there are a lot of record on paper to find their order details. | <ul style="list-style-type: none"> Seller can filter order status to find out which order that still unpacked. Seller and customer can view order details. | <ul style="list-style-type: none"> Filter order status View order |
| 3. | The seller sometimes miscalculate or forget about the time and date of delivery. | <ul style="list-style-type: none"> Seller can set notification as reminder for delivery | <ul style="list-style-type: none"> Set delivery notification |

Use Cases

The use case diagram shows possible interactions of the users or actors with the system. A use case diagram was constructed based on the gathered data after conducting an open-ended interview with a home-based owner that sells homemade food. There are two actors which are seller and customer in the use case diagram. A total of 9 use cases have been identified that consist of register, login, add to cart, view order, update order status, set notification delivery,

filter order status, upload payment evidence and give rating. Using the UML, the overall use case is illustrated in Fig. 1. 6 use cases are handled by the seller and 6 use cases by the customer.

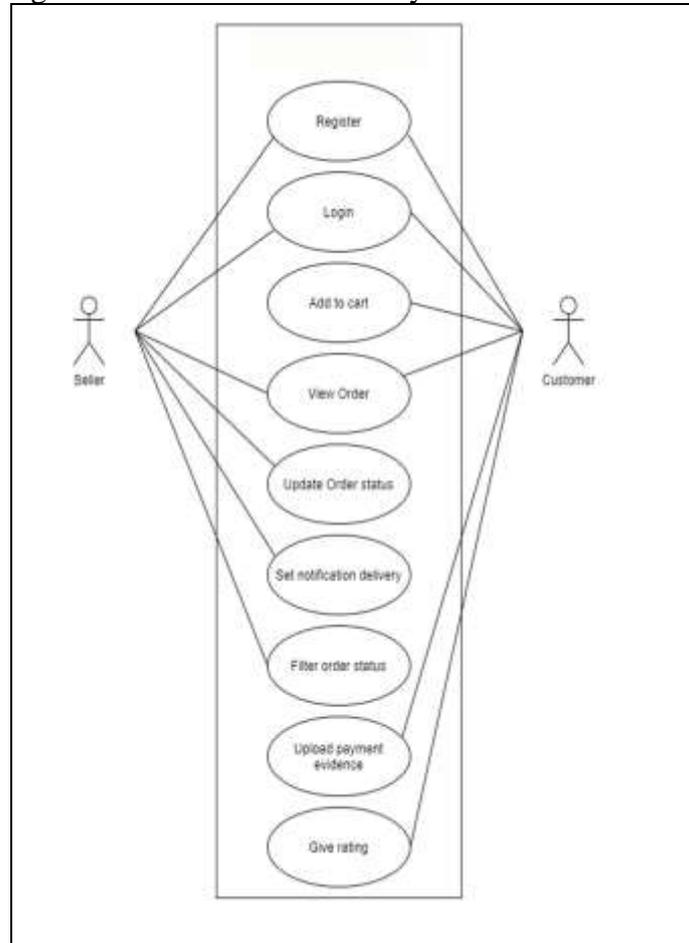


Figure 1: Use Case Diagram

System flowchart for the application

One output for design is a flowchart. A flowchart is a diagram that shows the flow of a process from the beginning to the end. It helps users to understand the process flow easier. Used for the project, Fig. 2 depicts the overall general flow of steps a seller can take and the action to be selected if any.

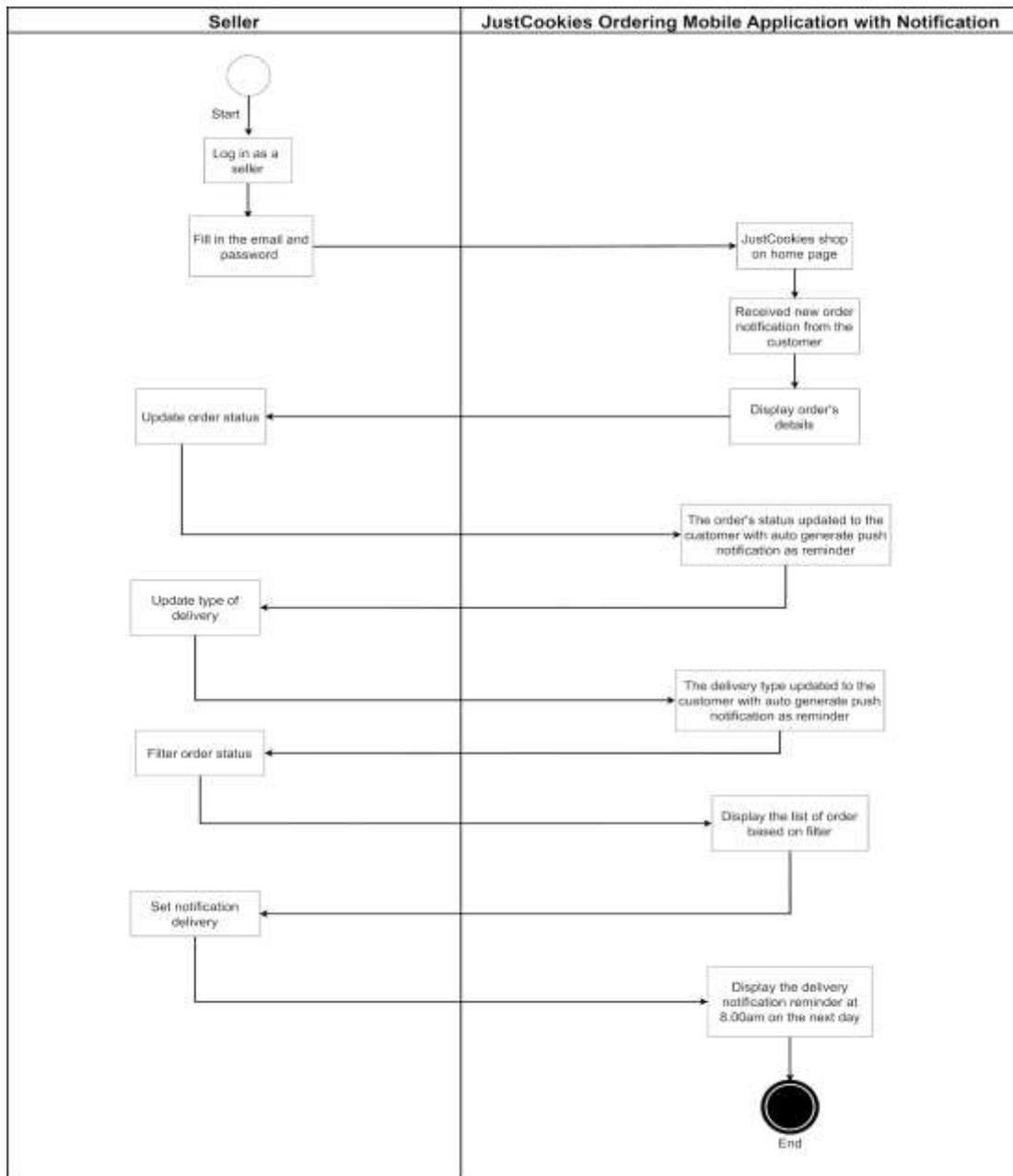


Figure 2: System overall flowchart for seller

Figure 3 illustrates the general flow of steps a customer can take from the start of the application until the end. It also shows the different actions a customer can choose throughout the process if any.

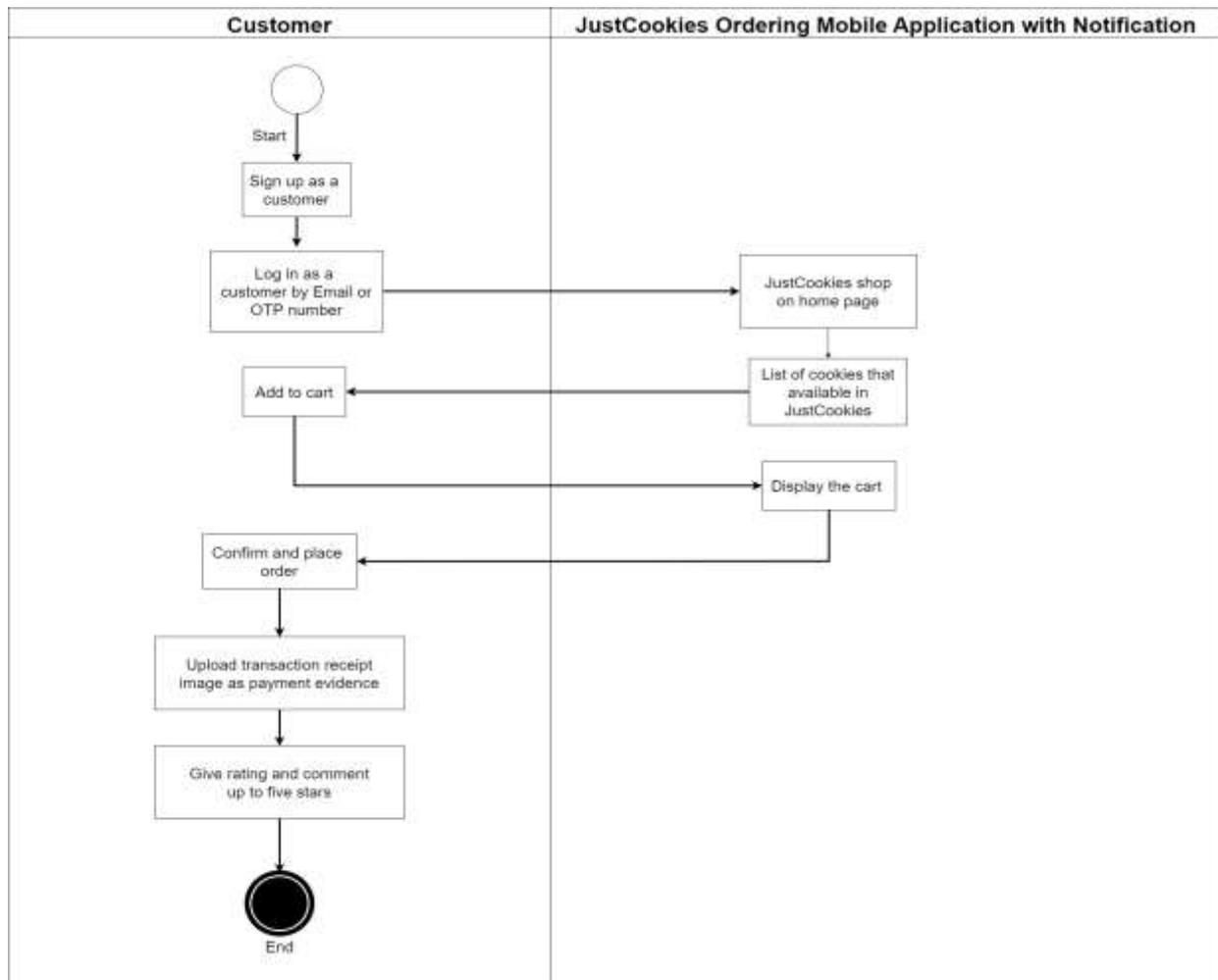


Figure 3: System overall flowchart for customer

Implementation

This phase involved converting all the design products such as the use case into actual project results. This project used Android Studio as the development tool, Firebase as database and Java as the language. The main features of this mobile application are view order by seller and also customer.

Figure 4 shows the interface of the customer order list in the history of a customer account. The customer needs to click on the order from history to get their order details.

Figure 5 shows the interface for customer order details. The order status and delivery will be displayed on this page. This is crucial information for a system like ordering application and the customer to keep track of their order.

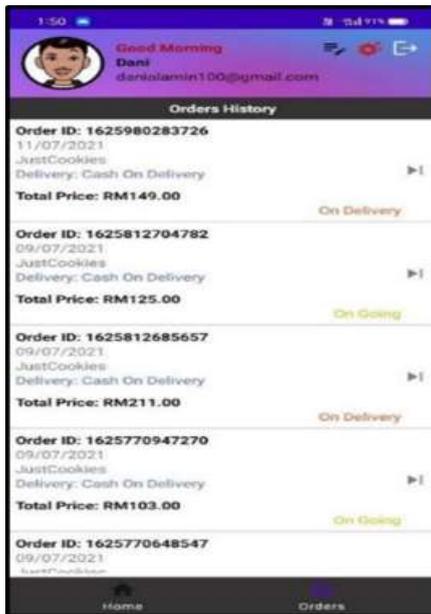


Figure 4: Customer Order Lists



Figure 5: Customer Order Details

Figure 6 shows the interface of the seller order list in account of a seller. The seller needs to click on the order from lists to get order details of the customer. Figure 7 shows the interface for the seller order details. The order status and delivery can be changed by the seller. So, the completion of an order is a decision made by a seller and not the customer based on evidence of payment that was uploaded by the customer.



Figure 6: Order Lists Seller



Figure 7: Order Details Seller

Results and Discussions

This section discusses the results and findings obtained from the research project. The functional testing was conducted to put focus on the main features or functions of this mobile application.

The mobile application's functionality was evaluated seven times from Test1 until Test7 based on the use case diagram of the application to ensure that the function fulfills the requirements and works appropriately for the user, and the results are shown in Table 3. From Test1 until Test7, all tests give a positive result for the functionality test.

Table 3: Functionality Test Results

| Component | Test1 | Test2 | Test3 | Test4 | Test5 | Test6 | Test7 |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|
| Register | Ok |
| Login | Ok |
| Add to cart | Ok |
| View order | Ok |
| Update order status | Ok |
| Set notification delivery | Ok |
| Filter order status | Ok |
| Upload payment evidence | Ok |
| Give rating | Ok |

Figure 8 shows the customer is able to add the products into the cart. Figure 9 shows the customer order list. Figure 10 and Figure 11 shows the list of orders that can be viewed by the customer and seller. The order consists of five types of status which are Ongoing, Packing, On Delivery, Complete and Cancel.

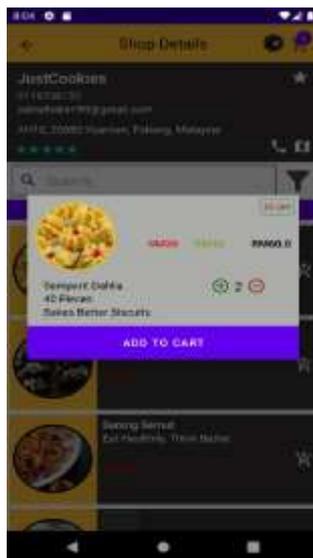


Figure 8: Add to Cart

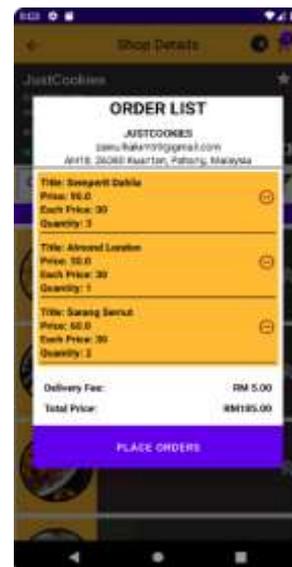


Figure 9: Customer order list



Figure 10: Order list customer



Figure 11: Order list seller

Figure 12 shows the seller can set a notification at 8.00 am every day to remind about making delivery. Figure 13 shows seller notification for new orders. This notification is auto sent to the seller when the customer places an order. Figure 14 shows customer notification for order status update. When the seller updates the order status and the type of delivery, the customer receives the notification. Figure 15 shows auto generated notification to the seller when the customer uploads payment.

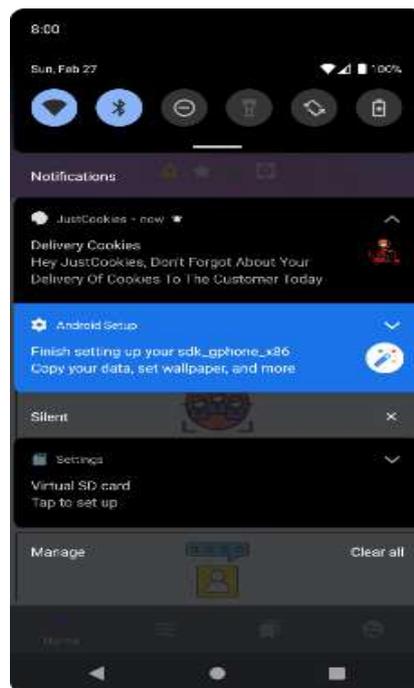


Figure 12: Seller delivery notification



Figure 13: Seller notification for new orders



Figure 14: Customer notification for order status update



Figure 15: Seller notification when customer upload payment

Conclusion

This study aims to develop a mobile application for home-based business owners to manage taking orders systematically. At the same time, the application also allows the customers to place orders conveniently from one single platform. The notification features are added to optimize the order and delivery process to be error-free and convenient to both the sellers and the customers. The application was developed successfully according to the system requirement. The results from the functionality testing by evaluating the 9 use case functions prove the application functions work correctly. This shows the mobile application has the potential to be used by sellers to manage orders and delivery to be more organized. For next improvement, the proposed system not only as a platform for ordering but for payment as well. For now, the mobile application is only a platform that can create orders, but the payment is made through a third- party application. Next, the current system can be upgraded by adding a chatbot feature into the application as a medium of communication between seller and customer.

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References

- A.H.Garbrick, Factors Influencing Student Engagement in an Online Asynchronous Discussion Forum Measured by Quantity, Quality, Survey, and Social Network Analysis, The Graduate School, Department of Learning and Performance Systems, The Pennsylvania State University, 2018.
- C.C. Williams, S.Nadin, P.Rodgers, R.Wapshott, J.Windebank, N.Williams and T.Vorley, "Evaluating the Participation of Students in the Informal Economy: Some Evidence from

- a European Survey,” *Journal of Economy and its Applications*, vol. 2, issue 1, pp. 51-65, 2012.
- [D.Gavilan](#) and [G. Martinez-Navarro](#), Exploring user’s experience of push notifications: a grounded theory approach, [Qualitative Market Research](#), ISSN: 1352-2752, 2022.
- D.Reuschke and M.Domecka, “Policy Brief on Home-Based Businesses,” *OECD SME and Entrepreneurship Papers*, pp. 37, no. 11, <https://doi.org/10.1787/abfe755f-en>, 2019.
- E.Isikligil, S.Samakay, and D.Kilinç, “A Prototype Framework for High Performance Push Notifications,” *International Journal of Computer Applications*. vol. 166, pp. 8-11. 10.5120/ijca2017914122, 2017.
- M.B.Sridhar. Model driven software engineering in the mobile era with an emphasis on security. *International Journal of Electronics Communication and Computer Engineering*, 6(6), 616–623. 2015.
- M.N.Mat Nayan and M.K.A.Hassan, “Customer Satisfaction Evaluation for Online Food Service Delivery System in Malaysia,” *Journal of Information System and Technology Management*, vol. 5(19), pp. 123–136.<https://doi.org/10.35631/jistm.5190010>, 2020.
- Mr. Zainul, personal communication, September 21, 2020.
- N. Anwar, M. A. M. Rizal, H. A. Mustamum, K. M. Taib, A. A. Razak and Z. Nordin, "Mobile Application Development: A Preliminary Study," 2020 International Conference on Information Management and Technology (ICIMTech), Bandung, Indonesia., pp. 951-956, doi: 10.1109/ICIMTech50083.2020.9211289, 2020.
- Phongtraychack, Anachack and Dolgaya, Darya,. Evolution of Mobile Applications, *MATEC Web of Conferences*. 155. 01027. 10.1051/mateconf/201815501027, 2018.
- [R.J. Nathan](#), [V. Victor](#), [G. C. Lay](#) and [S.Kot](#), “Electronic commerce for Home-based Businesses in Emerging and Developed Economy,” [Eurasian Business Review](#), vol. 9, pp. 463–483, 2019.
- R.Sulaiman and S.S.Mohamed Shariff, “The Transformation of Home-Based Businesses into electronic-HomeBased Businesses,” in 2012 International Conference on Economics, Business Innovation IPEDR, IACSIT Press, Singapore, 2012. vol 38.
- [S.Kraus](#), [C.Palmer](#), [N.G. Eason](#), B. Noble, and I. N. Sneddon, “Digital entrepreneurship: A research agenda on new business models for the twenty-first century,” [International Journal of Entrepreneurial Behavior & Research](#), 2019.
- S.Nambisan, “Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship,” *Entrepreneurship Theory and Practice*, vol. 41, issue: 6, pp. 1029-1055, November 2017.
- T.Stevens, Rehab Tracker: Framework For Monitoring and Enhancing NMES Patient Compliance. The Faculty of the Graduate College, The University of Vermont, Thesis, 2019.
- U.Rani, S.Barjtya and A.Sharma, “A detailed study of Software Development Life Cycle (SDLC) Models,” *International Journal of Engineering and Computer Science*, 6(7). Retrieved from <http://103.53.42.157/index.php/ijecs/article/view/2830>, 2017.