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# Development of an Integrated Mobile Application for Food Ordering and Delivery

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**Abstract**: The Ultimate One-Stop Food Mobile App (QuickBites) aims to revolutionize the food industry within the UiTM Machang campus by providing a user-friendly platform for seamless food ordering and delivery. This mobile application targets students, lecturers, and staff, addressing the challenges of long queues and promoting healthier meal options. Utilizing Android Studio for development and Firebase for real-time data synchronization, the app employs a Rapid Application Development (RAD) approach for swift deployment. The primary objectives of QuickBites include identifying challenges in managing food delivery services, developing an efficient one-stop food center, and evaluating the functionality and usability of the system. Through extensive research and feedback, key issues such as long wait times and the inconvenience of physically visiting food stores were identified. QuickBites addresses these by offering a streamlined interface, real-time order tracking, and integration with various campus food vendors, enhancing the overall food ordering experience. The current version of QuickBites supports only Cash on Delivery (COD) as the payment method. This decision was made to simplify the initial rollout and ensure ease of use for all users. However, this limitation also highlights the need for future enhancements to incorporate diverse payment options to cater to varied user preferences. In conclusion, QuickBites significantly improves the food ordering and delivery experience at UiTM Machang, providing a reliable and efficient tool that meets the needs of its target audience, while also highlighting areas for ongoing enhancement.

**Keywords**: Food Mobile App, Mobile Application, Delivery Service, Ordering System

## 1 Introduction

The food delivery industry is rapidly growing and evolving, driven by the increasing demand for convenient and accessible dining options. Mobile-based Food Delivery Applications (FDAs) allow users to browse menus, compare options, and place orders within minutes, significantly reducing time spent on dining decisions. Popular platforms such as GrabFood, and Foodpanda have capitalized on this trend by offering diverse features, including real-time tracking, multiple payment methods, and promotional discounts. However, while these applications share common goals, they differ in execution. These variations highlight how FDA providers adopt distinct strategies to meet evolving consumer lifestyles, particularly those shaped by hectic work schedules and urbanization. A critical evaluation of these differences is essential to understand which features most effectively enhance user satisfaction

and loyalty. According to [1] the usage of FDAs has increased due to a few changes in consumer lifestyles, including hectic work schedules.

Indeed, it is common for universities to have a variety of food stalls or cafeteria on their campuses to serve both students and lecturers. These food outlets cater to diverse needs of the campus community and provide options for quick snacks, lunches, and beverages. For this project, it will focus on one-stop food delivery on campus. University Teknologi Mara (UiTM) Machang campus is a lively academic institution with a diversified population of learners that provides a conductive environment for learning.

The campus has a multitude of stall selling snacks and heavy food, but the traditional process of walking to these stalls, standing in queue and waiting for others can be time-consuming especially during tight breaks between classes and lectures has led to dissatisfaction among students and lecturers. However, one of the recurring challenges faced by students and lecturers alike is the inconvenience of accessing food services on campus. While the presence of food stalls on university campuses is common and beneficial, it's also essential for institutions to adapt to changing needs and technologies to further enhance convenience and accessibility for students and faculty.

To address this issue and enhance the overall campus experience, the development of a dedicated food delivery application tailored to the needs of UiTM Machang is imperative. QuickBites: The Ultimate One-Stop Food Delivery App will streamline the process of ordering food by allowing students and lecturers to place orders from their smartphones and have their chosen items delivered directly to their location on campus. Unlike existing FDAs such as GrabFood or Foodpanda, QuickBites introduces campus-specific innovations, including precise delivery to classrooms and common areas, integration with campus payment systems, and pre-ordering options for short breaks between lectures. These features are designed to meet the unique time constraints and convenience needs of the academic community, making QuickBites a novel solution that goes beyond traditional food delivery services. The goal is to improve the overall dining experience by increasing accessibility and efficiency when obtaining meals and snacks from campus stalls and cafeterias.

## 2 Literature Review

A common mobile technology called Food Delivery Applications links customers and restaurants through an online-to-offline integration delivery service. Through third-party online middlemen, customers make online purchases, and service providers bring the food right to their door. The entire process will culminate in contactless delivery for customers. Technology plays a major role in meal delivery services based on smartphones. The order procedure takes only minutes to complete, and the apps download in a matter of seconds [2]. According to [3], it is imperative that people alter their eating habits considering the new dining experiences that technology is facilitating. Technology has greatly expanded the potential of the FDA sector, but there are also a lot of competitors in this market, which presents both opportunities and challenges.

There are two types of food delivery services which are restaurant-to-consumer and platform-to-consumer [4]. Food is prepared and delivered by restaurant-to-consumer delivery services like Domino's, KFC, and McDonald's. The customer has the option of ordering food through the restaurant's website or an online food delivery service. Various online food delivery platforms are available in some countries some examples are Uber Eats in the US, Eleme in China, Just Eat in the UK, and FoodPanda in Malaysia [4].

For the development of QuickBites app, it used Android Studio and Firebase. The Android Studio software created a user-friendly layout using XML and Java classes. For processing requests, accessing, storing, and maintaining data on the backend, PHP and MySQL are used [5]. Android Studio was chosen for its comprehensive features and efficient development environment, which facilitated the creation of a user-friendly interface and robust backend [6-7]. However the firebase was integrated for its versatile database management capabilities, real-time data synchronization, and user authentication

features [9]. These tools were essential in ensuring that the QuickBites app provided a seamless and efficient user experience for students and staff at UiTM Machang.

Examining similar food delivery applications or related works offers valuable insights when developing The Ultimate One-Stop Food. The comparison between the features in the existing food delivery application proposed system can be seen in Table 1.

Table 1: Summary of comparison between the proposed system and existing food delivery applications

| Features | QuickBites | FoodPanda | GrabFood | DahMakan |
|---|---|---|---|---|
| Area of delivery | Available in UiTM Machang campus | The entire state of Malaysia, but just in specific areas | Available in the Klang Valley and grown to certain regions | Kuala Lumpur and Selangor area only. |
| Payment options | Cash on delivery | Cash, credit card and online banking | Debit/credit cards, GrabPay Credits and PayPal | Cash and PayPal |
| Operating hours | 24 hours delivery | 24 hours delivery | Depending on the area and local restaurant hours, | 9 am – 9.30 pm |
| Delivery charge | RM2.00 | > RM5.00x` | > RM5.00 | Free and < RM5.00 |
| System's platform | Mobile application | Mobile application | Mobile application | Web and mobile application |
| Food Ordering | Available for user's in the UiTM Machang campus area that registered with QuickBites | Available from user's nearest location of food outlets that registered with FoodPanda | Available from user's nearest location of food outlets that registered with GrabFood. | Preparing homecooked meals by their own business. |
| Notification | Notify the customer that the rider arrived at the restaurant and arrived at their doorstep. | Notify the customer that the rider arrived at the restaurant and arrived at their doorstep. | Notify the customer that the rider arrived at the restaurant and arrived at their doorstep. | Users will receive in-app notifications of their rider's estimate time of arriving based on GPS tracking. The user will also receive a dispatch SMS update about the rider's arrival. |

## 3 Methodology

The RAD method was chosen as the software development model because it offers a range of well-matching characteristics, including high granularity specification steps and the duration of an application development step, all of which are carried out in close collaboration between project participants. Furthermore, the RAD model was the best course of action for this app development project because of the project's time constraints and resource limitations [10-11].

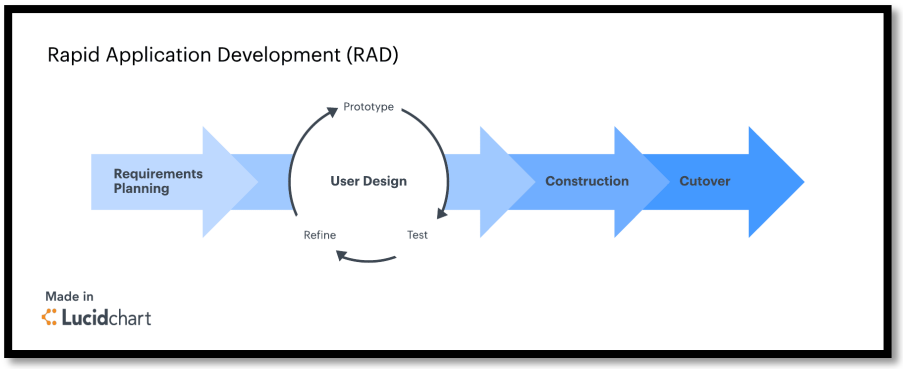



Figure 1: Rapid Application Development (RAD)
*Source: Adapted from [10]*

The four steps of Rapid Application Development (RAD) are requirements planning, user design, quick building, and cutover. Everyone involved in the project will periodically check in to see how things are going, work out any kinks in the development process, and increase productivity. By involving clients in the development process from the beginning to the end, RAD can lower the chance of requirements not being met, saving time and effort [12].

## 4 Proposed Framework

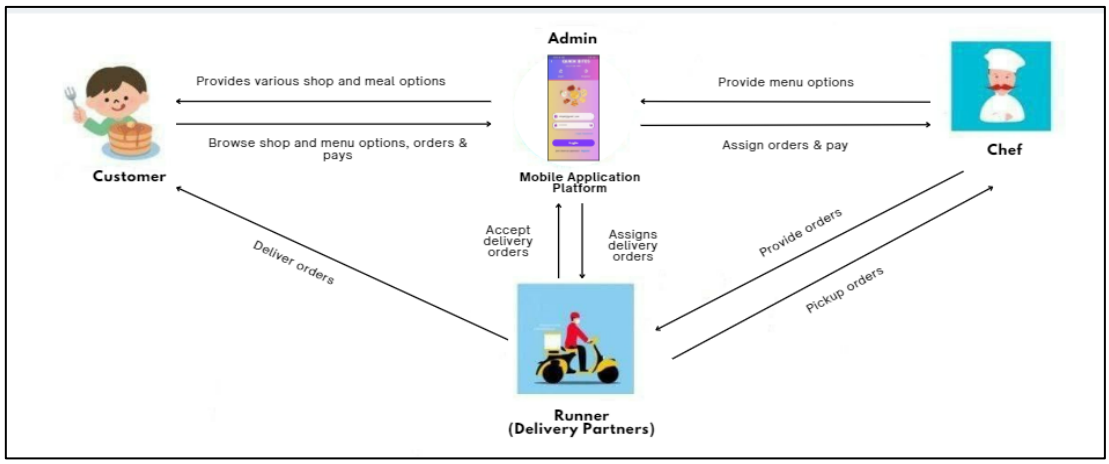



Figure 2. System Architecture Framework of The Ultimate One-Stop Food Mobile Application (QuickBites)

Figure 2 shows the system architecture framework of The Ultimate One-Stop Food Mobile Application (QuickBites), consisting of three main components, which are customer, chef, and runner. With a range of features and services, the framework design of this meal delivery software seeks to empower both parties. Firstly, the customer interacts with the mobile application to make personal profiles, explore various restaurants and their menu offerings, as curated by the chef. Upon selecting their desired items, the customer places an order, follow the progress of deliveries and makes the necessary payment. Similarly, food service operators which is called as chef use the app to manage incoming orders and update menus. After the chef receives the order details and food is ready, they will hand it over to the delivery partner.

On the other hand, the runner is the person who delivers the customer's order to their doorstep and can view the page where the product is to be picked up for the delivery. The current version for this app supports only Cash on Delivery (COD) as the payment method. This decision was made to simplify the initial rollout and ensure ease of use for all users. While the admin function is instrumental in

maintaining the app's integrity, overseeing user interactions, managing restaurant partnerships, and ensuring a seamless experience for both users and restaurant owners. This approach facilitates efficient interactions and management within the food delivery ecosystem, enhancing convenience and satisfaction for users on both ends of the service.

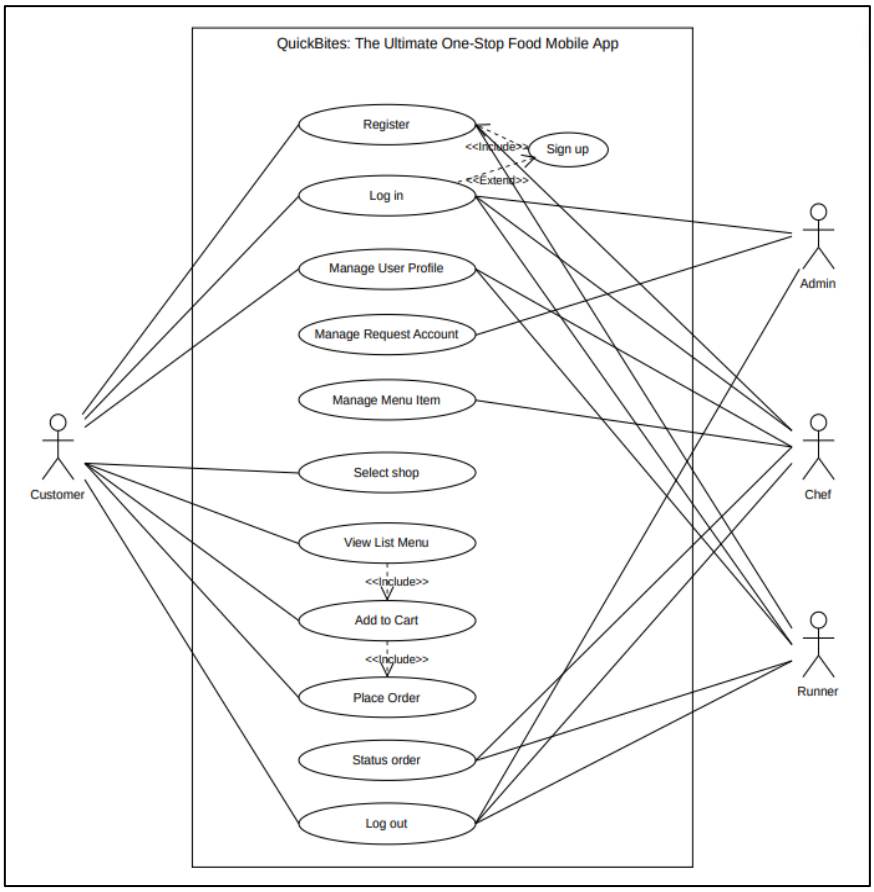



Figure 3: Use case diagram for QuickBites app

The figure 3 is a use case diagram for QuickBites app which outlines various functionalities available to different users within the app. It shows four types of users which is Customer, Admin, and Chef, and Runner with different interactions with the app. The Customer's interactions include a range of functions from registration, manage their profiles, select shops, view menus, add items to their cart, place orders, check order status, and log out. Admins oversee the system by managing request account from chef and runner. While chefs are responsible for managing menu items, checking order statuses, and logging into and out of the system to ensure food preparation aligns with customer orders. Runners log in to check and update the status of deliveries, ensuring orders are efficiently delivered to customers, and log out once their tasks are completed. This integrated interaction ensures the seamless operation of the food delivery service, catering to the needs of all stakeholders involved.

## 5 Implementation

The first step during the initial phase of developing The Ultimate One-Stop Food Mobile Application (QuickBites), is creating a project in Android Studio for development and Firestore Database for data management.

## *A Android Studio*

Android Studio provides a robust environment for developing QuickBites application. The screenshots (Figure 4) demonstrate the use of various widgets, state management, and Firebase integration to create interactive and secure features for different users (customer, chef, and runner) within the app. The project structure and code organization facilitate easy navigation and development of specific functionalities for each user role. The integrated emulator allows for instant testing of the app on various virtual devices, ensuring it runs smoothly across different screen sizes and Android versions. This combination of tools and features makes Android Studio indispensable for efficiently developing, testing, and refining a food delivery app.

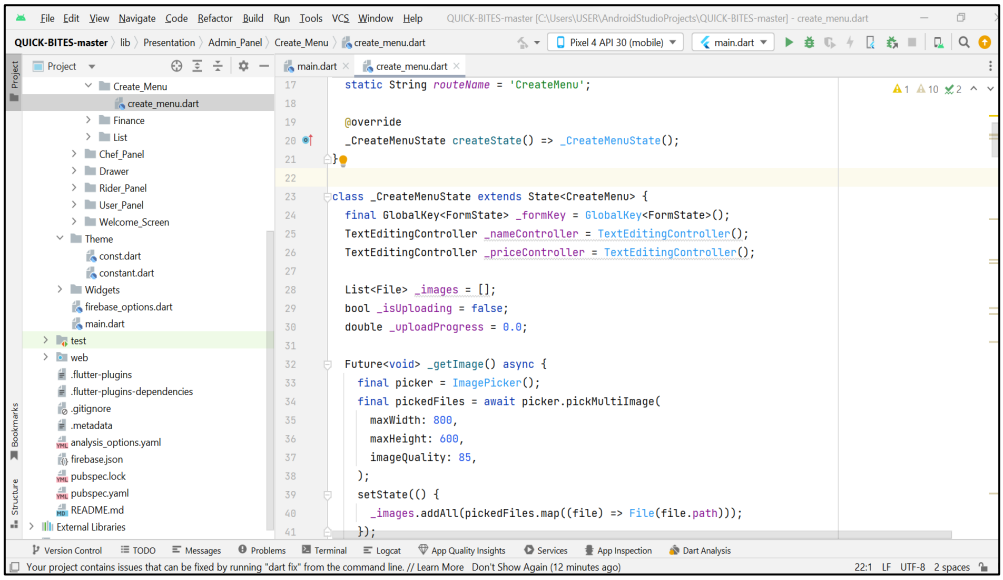



Figure 4: Sample of Android Studio demonstrates the use of widget, state management, and Firebase integration

## *B Firestore Database*

Firestore, a flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud Platform, plays a critical role in developing a QuickBites app. In the provided screenshot, Firestore is used to store and manage data for the app, such as menu items, user information, and order details. Firestore's real-time capabilities enable instant updates across all client devices whenever the data changes. This feature is particularly useful in a food delivery app, where menu items, availability, and order statuses need to be synchronized in real-time to provide accurate and up-to-date information to users and restaurant owners.

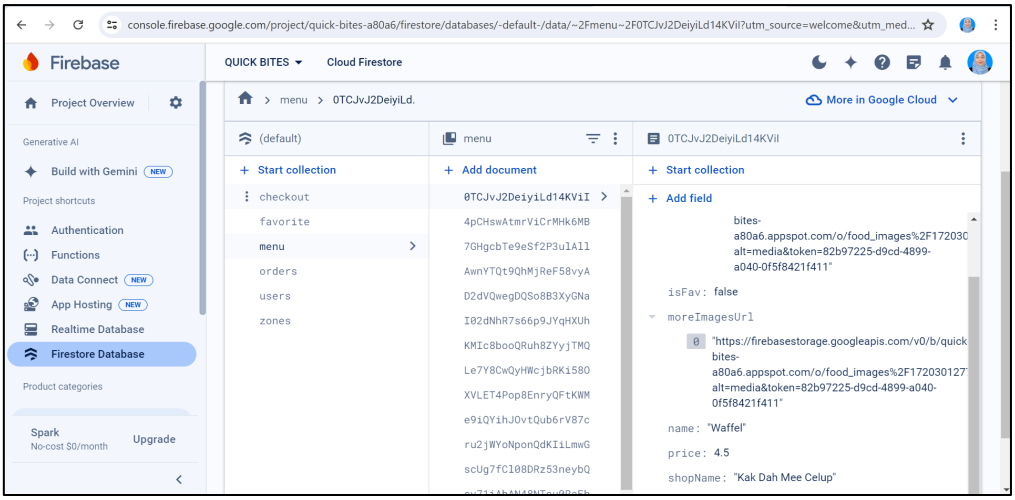



Figure 5: Firestore database

## *C User Interface*

Figure 6 below shows the role page of QuickBites Application, to cater to users in the UiTM Machang campus area, offering a seamless way to connect for food-related services. The main screen features three distinct buttons, each representing a different user role: "Connect as Customer," "Connect as Chef," and "Connect as Runner." This intuitive button ensures that users can easily navigate the app and select their desired role with minimal effort.

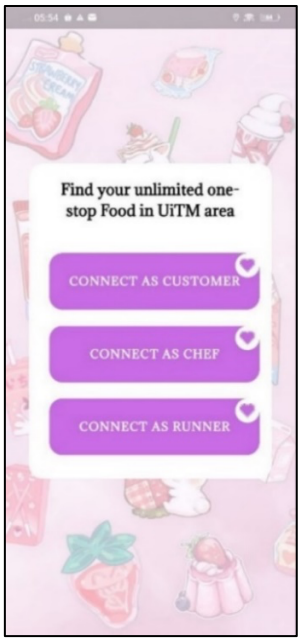



Figure 6:

Figure 7 shows, during the initial registration process, users are required to provide specific information based on their designated role. Customers must enter their email address, full name, username, password, and a repeated password . Chefs are required to provide their email address, full name, shop name, password, and a repeated password. Runners must supply their email address, full name, username, password, and a repeated password. This secure and streamlined login process ensures that only authorised users can access the system, maintaining the integrity and confidentiality of the application's data and functions.

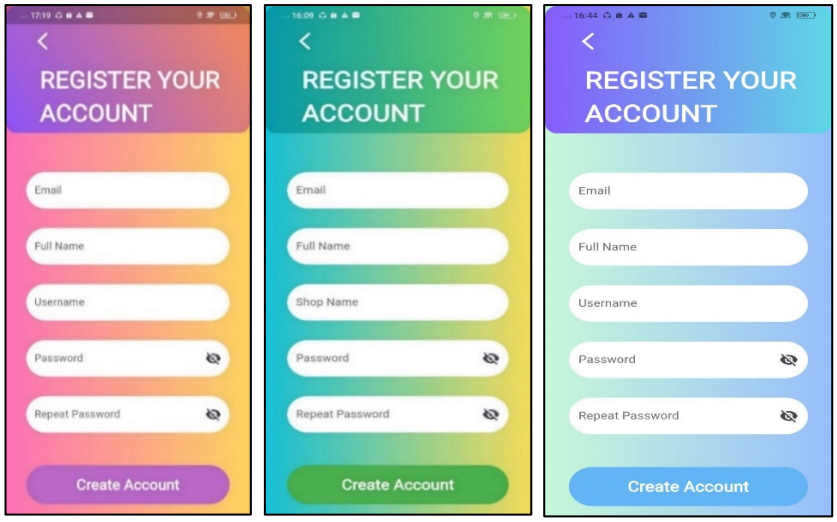
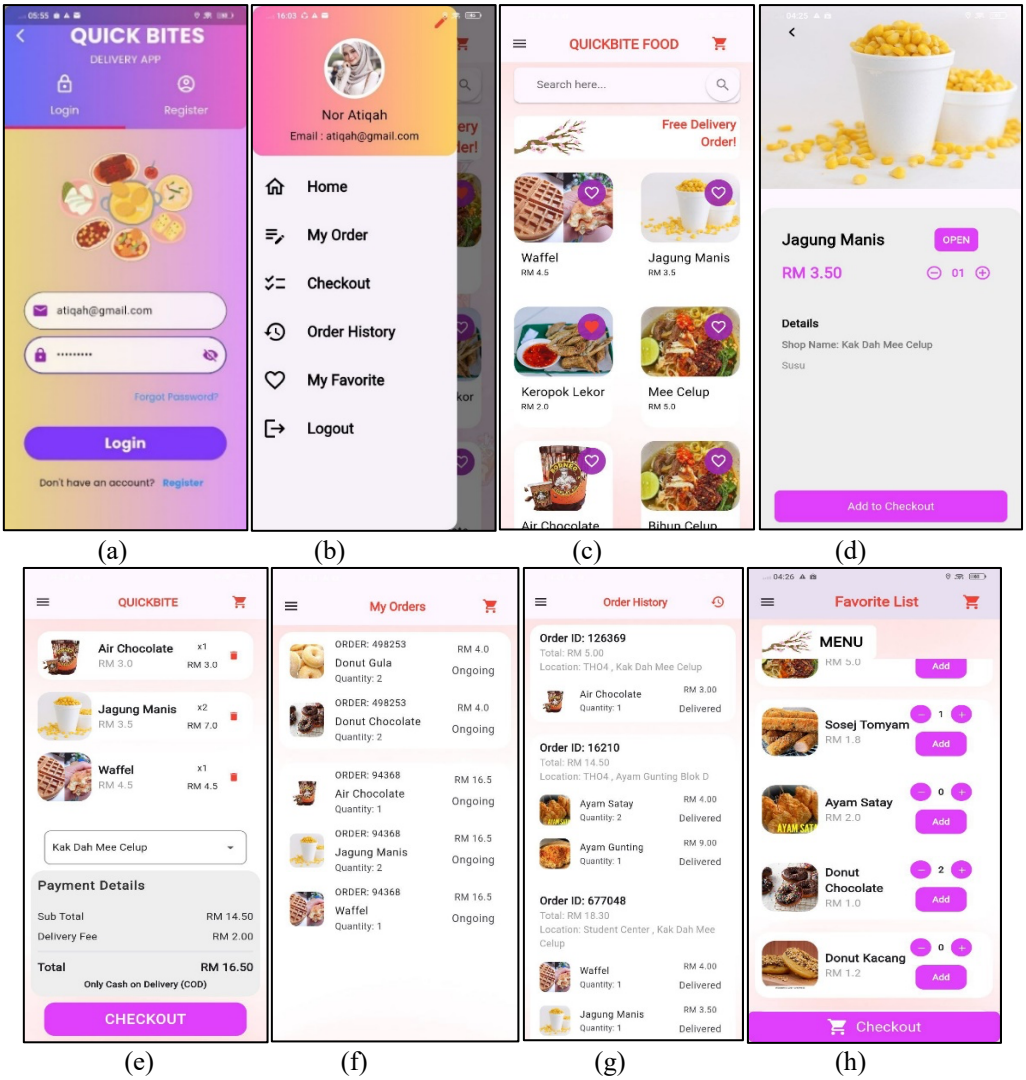



Figure 7 : Register Page for different roles: customer, chef, and runner

### i. Customer Page Interface

The Quick Bites application provides a comprehensive and user-friendly interface designed to support the entire food ordering process. Figure 8 show all the interface for customer page interface which display all of the features available. Figure 8a show the login screen allows users to access their accounts by entering their email and password, with additional options such as "Forgot Password?" for recovery and a "Register" link for new users. Once logged in, figure 8b show the profile and navigation drawer display the user's profile picture, name, and email address, which can be edited, and offer quick access to key sections including Home, My Order, Checkout, Order History, My Favorite, and Logout. The main food menu interface at figure 8c presents a searchable grid of food items complete with images, names, and prices, alongside a heart icon to mark favorites, a hamburger menu for navigation, and a cart icon for adding items. Then after user add the items, figure 8d show the product detail pages, such as for the "Jagung Manis" item, provide clear visuals, pricing, shop availability, and an "Add to Checkout" button for easy cart management.

The checkout screen at figure 8e show summarizes selected items, quantities, and prices, including subtotal, delivery fee, and total cost, with payment limited to cash on delivery (COD). Figure 8f, users can then track their ongoing orders through the order status interface, which lists order numbers, items, quantities, prices, and delivery progress marked as "Ongoing" or "On the way." A detailed order history section can see at figure 8g, the records past transactions with order IDs, total prices, delivery locations, item details, and fulfillment statuses such as "Delivered," enabling users to reorder or review expenses. Finally, at figure 8h the favorites screen highlights preferred dishes with thumbnails, names, and prices, offering quick reordering through "Add" buttons and quantity adjustment via "+" and "-" controls, ensuring a seamless and efficient food ordering experience.




(a) (b) (c) (d)

(e) (f) (g) (h)

Figure 8: Customer Page Interface

## ii. Chef Page Interface

Figure 9 provides a comprehensive set of interfaces tailored for chefs to manage their accounts, shops, menus, and orders. The login screen (Figure 9a) enables chefs to access their accounts using their email and password, with a "Forgot Password?" option for recovery. The profile interface (Figure 9b) displays the chef's profile picture, name, and email address, and includes a toggle to set the shop status as open or closed, alongside navigation options such as "Add Menu," "New Orders," "My Earnings," "Order History," and "Log Out." The menu management screen (Figure 9c) lists available food items with names, prices, and images, each accompanied by edit and delete icons for modification or removal. Adding new dishes is facilitated through a dedicated interface (Figure 9d), which provides input fields for item name, description, and price, and a "Publish Now" button to make the dish available to customers.

Order management (Figure 9e) is streamlined through categorized sections—"Ongoing," "Preparing," and "Ready to Delivery"—allowing chefs to track and update order statuses efficiently. Past orders are displayed in the order history screen (Figure 9f), which details items, quantities, prices, and statuses such as "Delivered," ensuring easy navigation and review of completed transactions. Earnings are summarized in a dedicated screen (Figure 9g), prominently showing total income (e.g., "RM 62.70 Total Earnings"), with navigation options accessible via the hamburger menu. Finally, the delivery zone

management interface (Figure 9h) allows chefs to define service areas and set corresponding delivery fees, ensuring flexibility in managing logistics and customer reach.

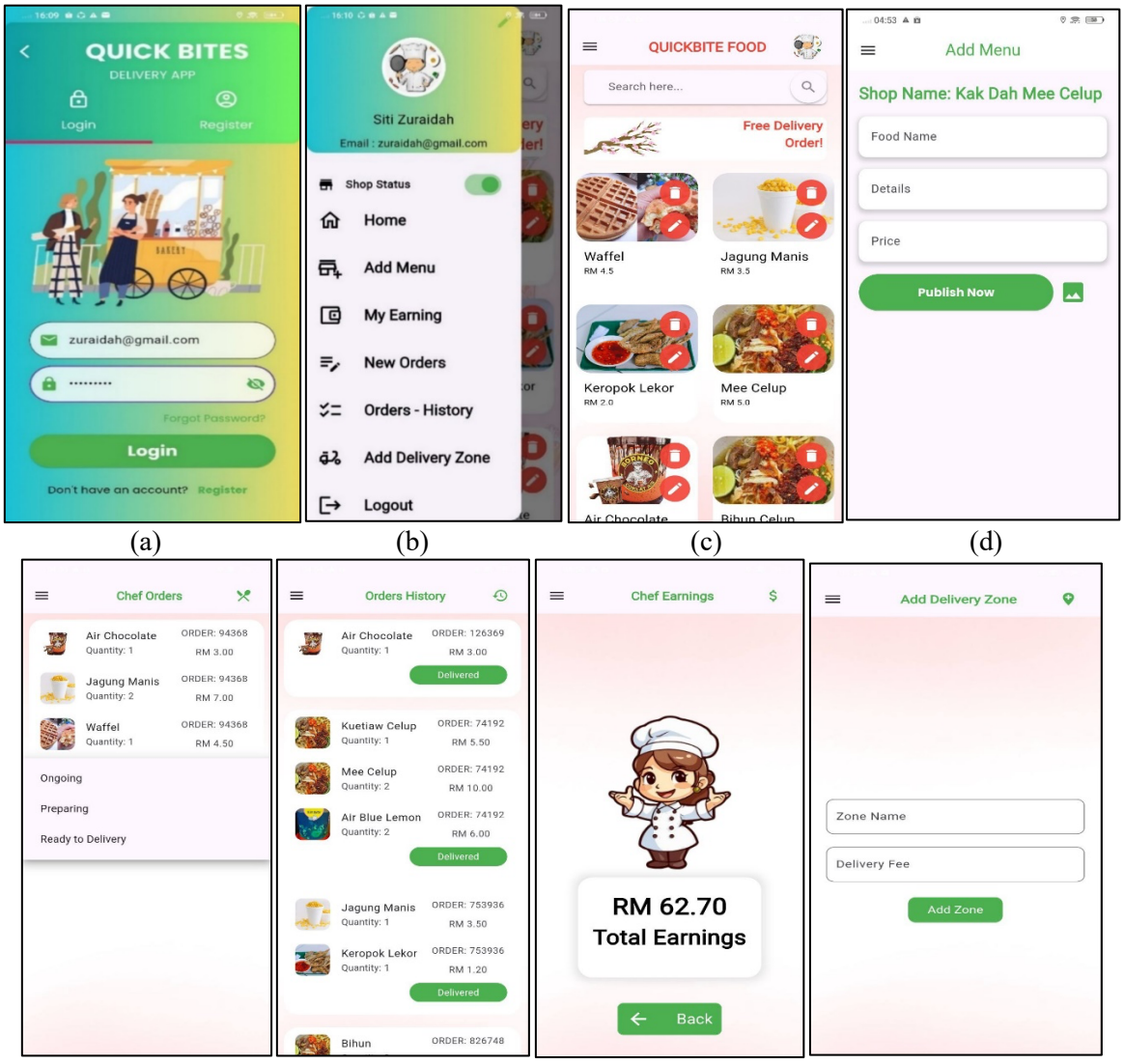
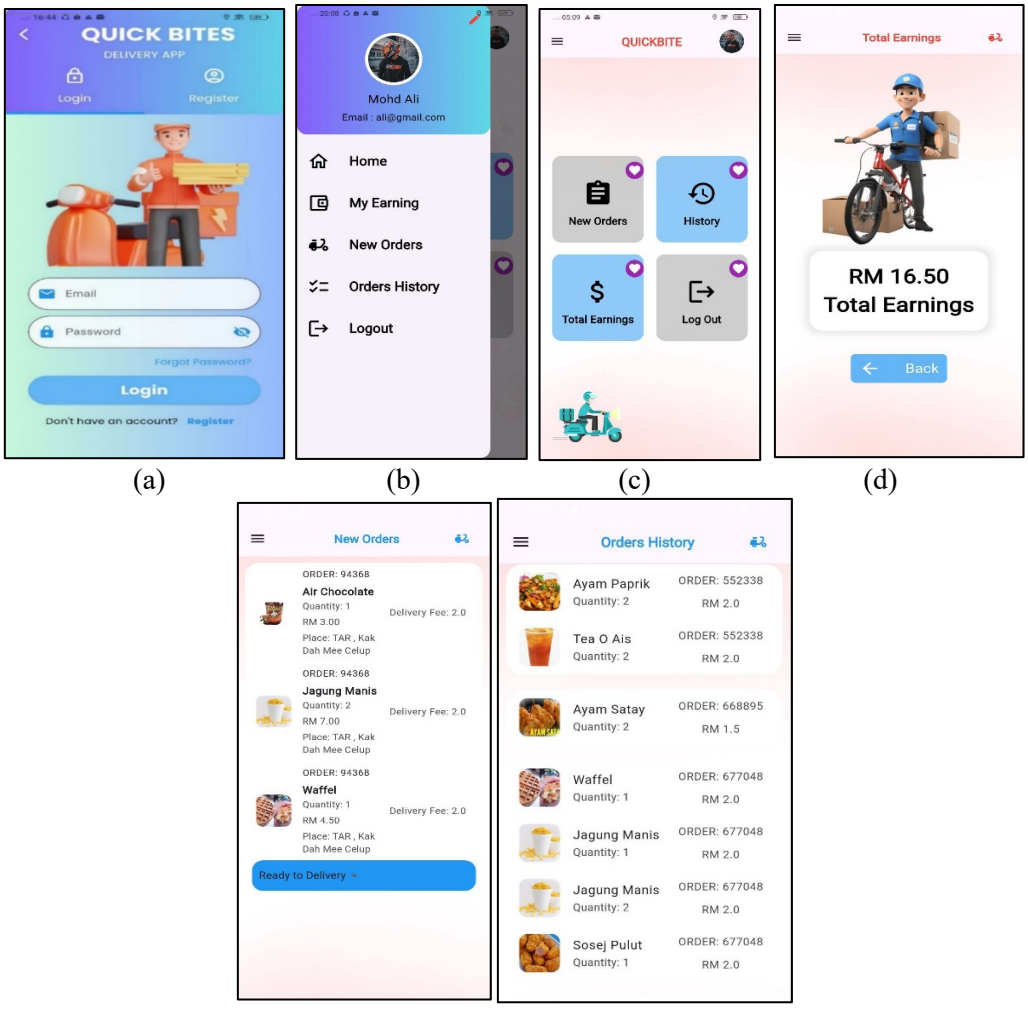



Figure 9: Chef Page Interface

### iii. Runner Page Interface

Figure 10 provides a series of interfaces designed to support runners in managing their delivery tasks and account activities. The login screen (Figure 10a) enables runners to securely access their accounts by entering their email and password, with a "Forgot Password?" link available for recovery, and the process completed by clicking the "Login" button. The dashboard (Figure 10b) offers quick access to essential functions through large, clickable tiles labeled “New Orders,” “History,” “Total Earnings,” and “Log Out.” A sidebar menu, accessible via the profile icon, displays the runner’s profile picture, name, and email, along with navigation options such as “Home,” “My Earnings,” “New Orders,” “Orders History,” and “Logout,” ensuring efficient navigation and management of orders and earnings. The earnings interface (Figures 10c and 10d) provides a clear summary of the runner’s total income, calculated based on delivery fees from completed orders. The New Orders screen (Figure 10e) lists incoming delivery requests with detailed information including food items, quantities, prices, delivery fees, and pickup locations, and features a “Ready to Delivery” button to update order status

once the runner has collected the items. Finally, the Orders History interface (Figure 10f) presents a chronological record of past deliveries, detailing food item names, quantities, and order numbers, thereby helping runners track performance and verify completed orders.




(a) (b) (c) (d)

(e) (f)

Figure 10: Runner Page Interface

## 6 Testing

After completing the implementation phase, the testing phase becomes crucial. This phase involves a comprehensive series of actions to research and analyse the actual levels of performance and quality of the project. Testing is essential to verify the actual versus expected results, ensuring the application undergoes a thorough testing before it is released to the user post development. This process guarantees practical functionality and alignment with user requirements. The usability testing was performed by three users from the stakeholder groups — customer, chef and runner. Eighty percent (80%) of usability problems can be identified with a sample of five users, a principle known as the 'magic number' [13]. The selected users tested the application and then answered the provided questions via Google Forms.

In evaluating the system's usability, the heuristics evaluation employs the SUS, a widely recognised tool consisting of a questionnaire with a scale ranging from 1 (strongly disagree) to 5 (strongly agree). Based on 10 standardised statements, this scale measures users' perceptions of the application's usability. The SUS helps quantify subjective user experiences and identifies areas for enhancement by

assessing factors such as perception of system complexity, ease of use, integration of functions, and confidence in the system. The sample of SUS questions used is as follows:

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

## 7 Result and Discussion

The testing phase results based on user responses were classified into perception of system complexity, ease of use, integration of functions, and confidence in using the system and are presented in the following figures below:

### *D Perception of System Complexity*

Figure 11 depicts the level of user satisfaction regarding the ease of use of the QuickBites app, based on responses from six users. Out of the six respondents, the majority, five users (83.3%), rated their satisfaction level at 4, indicating they find the app quite easy to use. One user (16.7%) rated their satisfaction at the highest level, 5, showing they are very satisfied with the app's ease of use. There were no ratings below 4, suggesting a generally high level of user satisfaction with the app's usability.

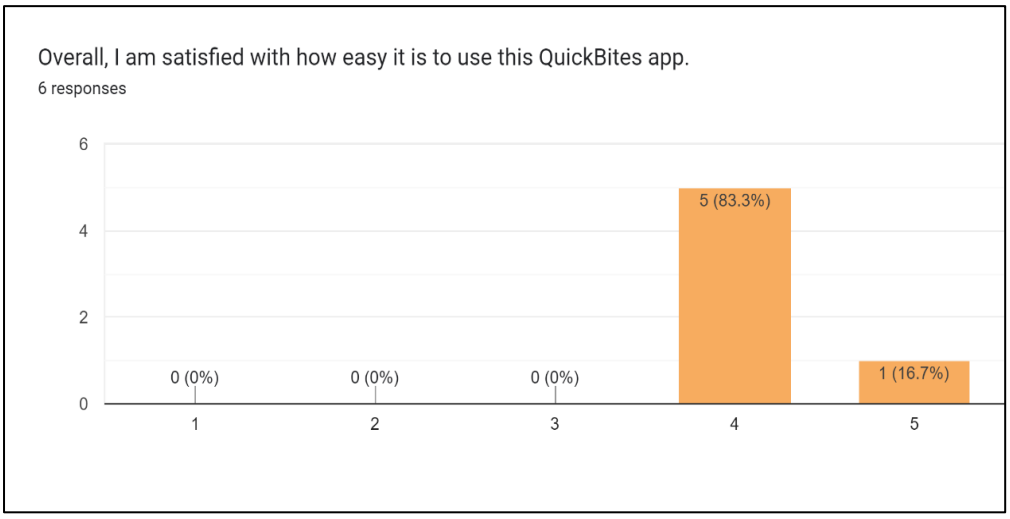



Figure 11: The satisfied of user on QuickBites app

### *E Easy of use*

Figure 12 illustrates user responses to the statement "I found it easy to place an order using the app," with six users participating. One user (16.7%) rated their experience at 2, another user (16.7%) rated it at 4, and the majority, four users (66.7%), rated it at 5, indicating a high level of ease. No users

rated their experience at 1 or 3. This suggests that most users found it very easy to place an order using the app, with only a small minority experiencing some difficulty.

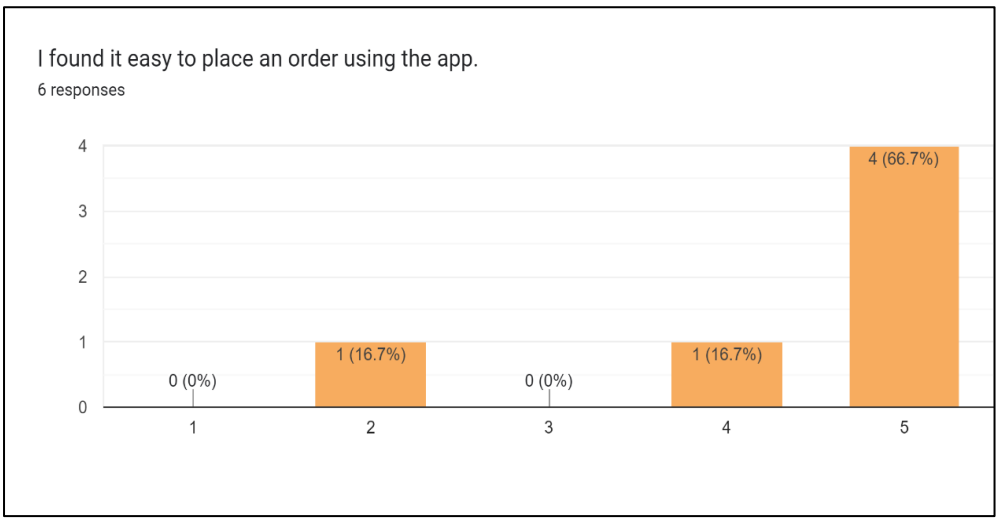



Figure 12: The ease of use the QuickBites app

## *F Integration of Functions*

Figure 13 shows the responses to the statement, "I thought there was too much inconsistency in this app." Here, 4 respondents (66.7%) rated their agreement with this statement as 2, indicating a disagreement that there is too much inconsistency. One respondent (16.7%) rated their agreement as 1 (strongly disagree), and another (16.7%) rated it as 3 (neutral), showing a minimal perception of inconsistency. No respondents selected the extremes of 4 or 5, which means that most users did not find significant inconsistencies in the app.

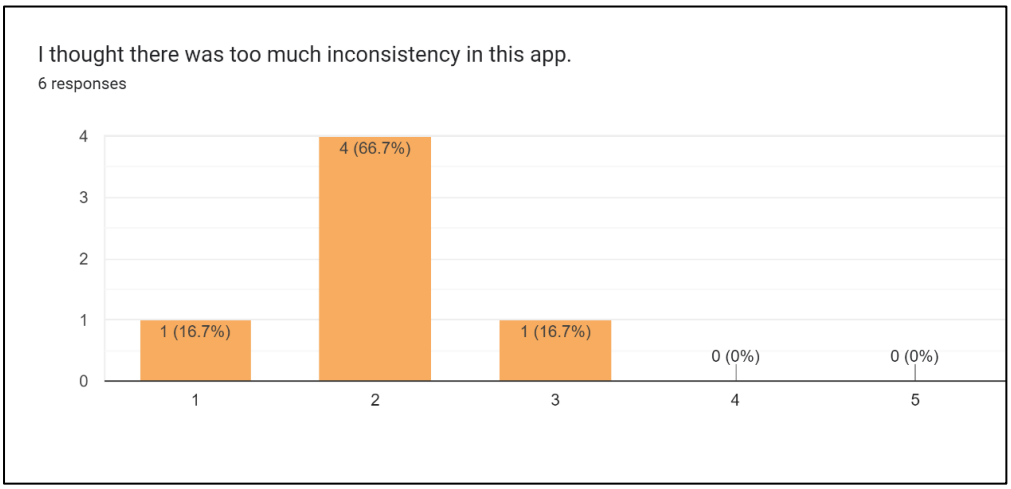



Figure 13: Inconsistency of QuickBites app

### *G System Consistency*

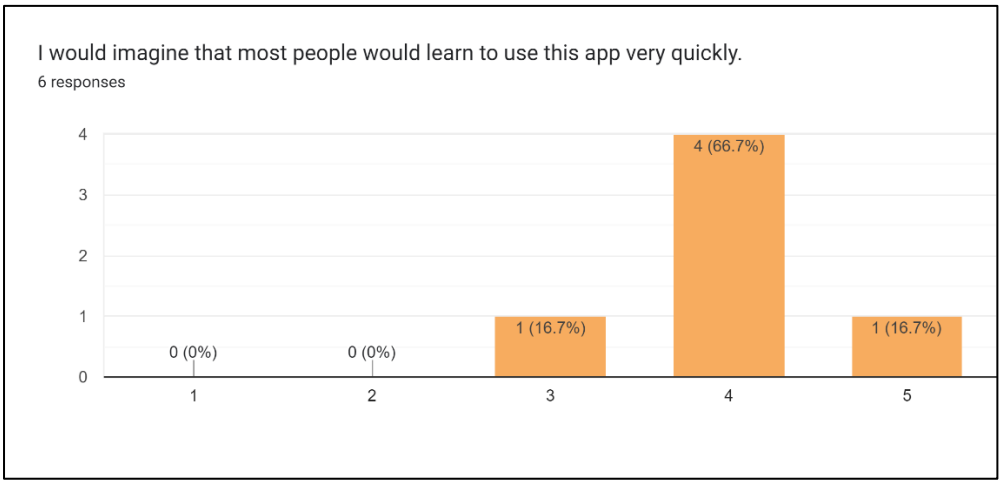



Figure 4.10: The respond of using QuickBites app

Figure 4.10 shows the responses to the statement, "I would imagine that most people would learn to use this app very quickly." Out of the 6 respondents, the majority (4 respondents, or 66.7%) rated their agreement with this statement as 4, indicating that they agree most people would learn to use the app quickly. One respondent (16.7%) rated their agreement as 3 (neutral), and another (16.7%) rated it as 5 (strongly agree). No respondents rated the extremes of 1 or 2, suggesting that there is a consensus that the app is easy to learn, with no strong disagreement.

## 8 Conclusion

In conclusion, the QuickBites app delivery application provides a comprehensive and user-friendly platform that supports the needs of customers, chefs, and runners alike. Each interface has been carefully designed to ensure clarity, efficiency, and ease of navigation, from account login and profile management to menu browsing, order processing, and earnings tracking. By integrating essential features such as secure authentication, intuitive dashboards, detailed order management, and transparent earnings summaries, the app enhances collaboration among all participants in the food delivery ecosystem. Ultimately, the QuickBites app not only streamlines the ordering and delivery process but also improves overall user satisfaction by offering a seamless and reliable digital experience.

## Acknowledgements

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## References


[1] A. Tandon, P. Kaur, Y. Bhatt, M. Mäntymäki, and A. Dhir, "Why do people purchase from food delivery apps? A consumer value perspective," Journal of Retailing and Consumer Services, vol. 63, p. 102667, 2021.

[2] N. Aqilah, Z. Abiddin, and I. E. Khairuddin, "User satisfaction on food delivery application (FDA) in Klang Valley," Journal of Information and Knowledge Management (JIKM), vol. 12, no. 2, 2022.

[3] K. G. See and S.-Y. Wong, "Outsourcing to online food delivery services: Perspective of F&B business owners," Journal of Internet Banking and Commerce, 2017. [Online]. Available: http://www.icommercecentral.com

[4] C. Li, M. Mirosa, and P. Bremer, "Review of online food delivery platforms and their impacts on sustainability," Sustainability, vol. 12, no. 14, 2020. doi: 10.3390/su12145528

[5] M. Ashraf, M. Abrar, B. Khan, U. C. Pakistan, and A. Mehmood, "A review of the usable food delivery apps," International Journal of Engineering Research & Technology (IJERT), 2019. [Online]. Available: www.ijert.org

[6] M. Isshad, D. M. Harith, N. I. Ramli, S. Zarina, and M. Muji, "Development of food giver mobile applications by using Android Studio," Evolution in Electrical and Electronic Engineering, vol. 2, no. 2, pp. 293–299, 2021. doi: 10.30880/eeee.2021.02.02.035

[7] L. Shyh, S. Klinsman, and R. Ibrahim, "Food ordering system mobile application," Applied Information Technology and Computer Science, vol. 3, no. 1, pp. 964–974, 2022. doi: 10.30880/aitcs.2022.03.01.065

[8] A. Saha, "Seamless realtime e-commerce Android application with Google Cloud Firebase backend," 2018.

[9] J. Almeida, "The advantages and disadvantages of the RAD model," DistantJob, May 23, 2025. [Online]. Available: https://distantjob.com/blog/rad-model-advantages-and-disadvantages/

[10] Kissflow, "13 RAD benefits and advantages you could certainly expect," Aug. 6, 2025. [Online]. Available: https://kissflow.com/application-development/rad/benefits-of-rapid-application-development/

[11] M. Cao, Y. Hu, R. Shi, and Z. Zhang, "Research on marketing strategy optimization of healthy food based on analysis of consumer behavior characteristics—Take Mint Health APP for example," in Proc. 2nd Int. Conf. on World Economy and Project Management (WEPM), 2021, pp. 73–78. Available: https://www.clausiuspress.com/conferences/LNEMSS/WEPM%202021/Y0731.pdf

[12] R. Alroobaea and P. J. Mayhew, "How many participants are enough for usability studies?" in 2014 Science and Information Conference, London, UK, 2014, pp. 48–56. doi: 10.1109/SAI.2014.6918171