Smart Shopping Cart Mobile Application (SmartCart): A Collaborative Shopping Cart System Across Multiple Devices

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Smart Shopping Cart Mobile Application (SmartCart): A Collaborative Shopping Cart System Across Multiple Devices

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Abstract: *The project focuses on developing SmartCart, a mobile application aimed at providing users with a safe shopping experience during the pandemic. It follows the Mobile Application Development Life Cycle (MADLC) and includes identification, design, development, prototyping, and testing phases. Key features include collaborative shopping, a QR/barcode scanner, and online payment capabilities. Compatible with Android and iOS devices, SmartCart encourages users to engage in collaborative shopping with friends and family members, fostering a sense of togetherness. Tested by ten users by using System Usability Scale (SUS), positive feedback was received regarding usability. However, the current version only supports credit/debit card payments via Stripe payment gateway. Future recommendations include adding e-wallet options and language preferences to accommodate a wider user base. These enhancements will further improve the shopping experience.*

Keywords: collaborative shopping; MADLC; mobile application; Mobile Application Development Life Cycle; online payment; shopping experience.

1. INTRODUCTION

The pandemic provoked by COVID-19 and the effects it has had on health, society and the economy are producing a change to the buying habits of customers in numerous sectors [1,2]. To address these challenges, businesses have embraced alternative channels such as mobile phones and the internet. These technologies have revolutionized the way people purchase items and services. While online shopping platforms have gained prominence, traditional shopping methods still hold appeal due to the ability to touch and examine products firsthand. However, anxieties associated with crowded places have driven the surge in e-commerce adoption. Collaborative shopping, preferred by many, enhances the overall experience but faces challenges such as long waiting times at payment sections. To enhance the shopping experience, the convergence of mobile phones, the internet, and barcode scanning applications has emerged as a transformative solution. Mobile barcode scanning applications on smartphones provide on-the-go access to product information and services.

This paper introduces Smart Shopping Cart mobile application (SmartCart), a smart shopping cart mobile application that leverages mobile technology, collaborative shopping, and IoT integration to revolutionize the traditional shopping experience. SmartCart aims to bridge the gap between offline and online shopping, enhancing efficiency, convenience, and safety. The application allows customers to scan items using their smartphones, facilitating self-checkout, and incorporating collaborative features across multiple devices. SmartCart addresses the evolving needs of customers during the Covid-19 pandemic and beyond.

This paper presented a comprehensive structure for the project, encompassing various key components. Part 2 delved into the Literature Review, analyzing previous studies and research conducted in the field. It provided a solid foundation for understanding the current state of knowledge and identifying the significance of the project. Part 3 outlined the Methods that will be employed throughout the project, detailing the phased approach to ensure a systematic and efficient development process. The project will progress through each phase, employing appropriate methodologies and techniques to achieve the desired outcomes. Part 4 showcased the Results and Discussion, presenting screen captures of the mobile applications developed as part of this project. The captured screens offered a visual representation of the project's progress and highlighted the key features and functionalities. Finally, Part 5 focused on the Conclusion, highlighting the complexity of the mobile app, and addressing any limitations encountered during the project. It also provided recommendations for future enhancements and further research to refine and expand the mobile app's capabilities. By embracing the power of mobile technology, collaborative shopping, and IoT integration, SmartCart represents a transformative step towards redefining the shopping experience in the digital age.

2. LITERATURE REVIEW

2.1 Traditional Shopping

Traditional shopping is the conventional method of purchasing goods or services from physical retail stores, where shoppers visit in person to interact with sales personnel and complete transactions on-site [3]. It offers the advantage of engaging the senses through tactile experiences and immediate product gratification [4]. Additionally, traditional shopping fosters social interactions, opportunities to escape their everyday life, and experiences of place attachment and social cohesion which reported a range of positive experiences when visiting shopping centers [5]. The immersive store environment with appealing displays adds to the overall shopping experience, enabling customers to explore

various stores, compare products, and make informed decisions [6].

Traditional shopping maintains its relevance and appeal due to its personalized, sensory, and social aspects that cannot be replicated digitally [7]. Traditional shopping methods can make customers feel the product quality personally when shopping online, especially for those experiential goods [8]. Retailers are now seeking to integrate technology and bridge the gap between traditional and online shopping, enhancing the overall shopping journey [9]. Advancements in technology are being leveraged to create a seamless and integrated experience that combines the benefits of traditional and online shopping for customers [10].

2.2 Online Shopping

Online shopping revolutionizes the way people shop by allowing them to purchase goods or services through the internet from virtual stores or e-commerce platforms [11]. It offers convenience and flexibility as customers can explore a vast selection of products, compare prices and reviews, and make purchases from the comfort of their own homes or any location with internet access [12]. Online shopping provides the freedom to shop at any time, bypassing the need to travel to physical stores [13]. It also offers doorstep delivery, saving shoppers from the hassle of commuting and carrying heavy bags [14]. Secure payment gateways and various payment methods ensure secure transactions [15]. Detailed product information, customer reviews, and ratings enable informed decision-making, while easy price comparison helps find the best deals [16]. However, limitations include the inability to physically inspect products and the potential for delivery delays or discrepancies [17]. Customer service and returns processes may also vary among online stores [18]. Overall, online shopping provides convenience, flexibility, a wide range of choices, and the ability to shop from anywhere with internet access, driving its continuous popularity and prompting businesses to adapt to the changing needs of online customers.

2.3 Online Shopping Intention

Online shopping intentions arise from an individual's inclination to transition from traditional shopping to online shopping. Online purchase intention refers to the level of a customer's determination to engage in a specific purchasing behavior through the internet at a particular moment [19]. The intention to shop online is primarily influenced by the perceived convenience experienced within the online shopping environment [20]. However, considering the pandemic and uncertain circumstances, customers have developed a new cognitive buying behavior towards online shopping, where they choose to shop online not just for convenience but also due to safety considerations [21]. Based on a Deloitte report, online shopping has witnessed increased exposure among customers in 2020. Established online shoppers continue to make frequent online purchases, while individuals who were previously not engaged in online shopping are compelled to alter their consumption habits due to circumstances such as movement control orders and safety concerns [22]. The support from the government and rapid advancements in development have established the groundwork for online businesses and stimulated a prevailing environment [23].

However, there are repercussions associated with having the highest level of online shopping intention in Malaysia. The year 2020 witnessed a significant increase in online shopping fraud cases, reaching nearly 70%, because of most customers transitioning to virtual shopping as the new norm [24]. As e-commerce continues to experience rapid growth, giving rise to cyber-crime, several underlying factors also impact customers' willingness to engage in online shopping. The behavior of Malaysian customers has undergone notable transformations, and their intentions to shop online are influenced by their apprehensions regarding this mode of shopping [25]. Prior research has demonstrated that Malaysian customers exhibit reluctance when it comes to online shopping due to their awareness of the associated risks in the online environment [26-28].

Statistics reveal that most sales, specifically 84%, take place in brick-and-mortar stores, indicating that a significant portion of customers, around 46%, still prioritize physical shopping and value face-to-face interactions with sellers [29]. This occurrence can be understood by the desire for real-time experiences, such as seeing, touching, and interacting with physical products, which accounts for 33% of the preference. Additionally, the need for immediate gratification, where customers can acquire the item instantly, makes up 13% of the inclination. These factors represent forms of community and connection that are often absent in online experiences [30]. Additional research revealed that 65% of customers state that they choose to shop in physical stores to circumvent shipping expenses [31]. Moreover, the lack of control in choosing perishable items like fruits renders online shopping unsuitable for such purchases.

2.4 Collaboration

Collaboration refers to working together with others in a coordinated manner to achieve common goals [32]. It comprises engaged participation, open communication, and decision-making by agreement [33]. Collaborative work combines the resources, knowledge, and skills of individuals to leverage their collective capabilities and achieve outcomes that surpass what can be done individually [34]. Collaboration is applicable across various fields, such as education [35], the workplace [36], and research [37]. It supports effective team dynamics, cross-functional cooperation, and the achievement of organizational objectives [38].

Technology plays a significant role in facilitating collaborative work, providing tools for remote communication, virtual collaboration, and information sharing. These tools enable effective collaboration in today's digital age.

2.5 Collaborative Shopping

Collaborative shopping, as opposed to typical individual purchasing decisions, is a group shopping behavior. Exploring the opinion evolution law of group collaborative shopping can therefore give a reference for businesses understanding group shopping behavior [39]. Shopping is typically conducted as an individual, however collaborative shopping experiences may help with planning and control, particularly amongst one group [40]. Customers may share their shopping experience with others when they use collaborative shopping platforms [41]. Customers' active participation leads to a more interactive and collaborative shopping experience in the social commerce setting [42].

For the context of this project, collaborative shopping lets the customers shop with their friends or family in a group physically, not fully virtually through their smartphone

only.

2.6 Collaborative Shopping Intention

Researchers have also observed that customers frequently visit retail spaces with friends or family members and that this collaborative shopping approach influences the shopping experiences of all those involved [43]. For the context of this project, collaborative shopping intention is the desire of individuals to involve others in the shopping process and make joint decisions. It stems from the belief that collaboration enhances the shopping experience and results in better outcomes [44]. Factors influencing collaborative shopping intention include social influence, trust in others' opinions, perceived benefits of collaboration, and the desire for a sense of community [45]. People with a higher intention to engage in collaborative shopping actively seek opportunities for group shopping, value the contributions of others, and participate in discussions [46]. This intention can manifest both offline, through shopping with friends or family, and online, through interactions on social media or group shopping platforms [47]. Understanding collaborative shopping intention helps businesses create strategies that foster collaboration and meet the needs of customers who value collective input and shared decision-making.

In the context of this project, user can use collaborative features that will be included in the mobile applications if they want to. User also can decide who will be the leader of the group shopping and who will be the members to shop collaboratively.

3. METHODS

Several lifecycle models, including the waterfall model, spiral model, agile model, and prototyping model, exist. While the process of developing applications for desktops, the web, or mobile devices may have some similarities, the fundamental steps remain consistent: gathering requirements, designing, implementing, testing, and delivering the final product [48-51]. However, the work details differ.

In the current computing landscape, traditional information systems are undergoing adaptation to meet the requirements of mobile application development [52]. It is important to note that the models used in traditional software development cannot be directly applied to mobile application development without significant modifications.

The decision to utilize MADLC to develop SmartCart mobile applications was based on the clear definition and elaboration of activities and tasks provided by Vithani & Kumar [48]. The framework contains seven phases which are identification, design, development, prototyping, testing, deployment, and maintenance. This project will only go through five phases which are identification, design, development, prototyping, and testing phase only as shown in Fig. 1.

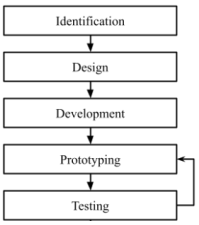


Fig. 1. MADLC Framework for Smart Shopping Cart Mobile Application (SmartCart).

3.1 Identification Phase

The initial phase of developing a mobile application involves gathering and categorizing ideas to generate a fresh concept or improve an existing application. Suggestions can come from users or developers and are further investigated for implementation. Brainstorming is crucial for creating new and innovative concepts, and existing applications on popular platforms are explored to assess uniqueness. If similar applications exist, their popularity and features are compared, and differences are noted. If no identical application is found, the concept and its basic features are detailed. Determining the time required for application development and completing the collection of basic requirements are essential tasks in this phase. The project goals include discovering the requirements for the mobile application. During the identification phase, related applications are reviewed, and a literature review is conducted using sources like Google Scholar, ResearchGate, and open online databases. Additionally, concept mapping is employed as part of the literature review process. The goal of this process was to gather data about mobile application components, design, features, functionalities, technologies, ideas, and scope.

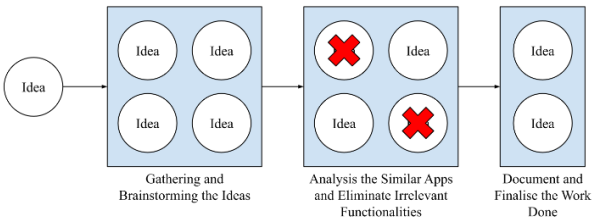


Fig. 2. Identification Phase.

3.2 Design Phase

In the design phase of developing a mobile application, the mobile application concept is transformed into an initial app design. The feasibility of developing the application for various mobile platforms is assessed, and the target platform is identified. The application's functionality is divided into modules and prototypes, which are combinations of modules presented in a prototype format. Functional specifications are established, and the software architecture of the application is developed. The design phase also involves creating a storyboard to illustrate the flow of the application's user interface (UI) interactions. The design work is documented for use in the development phase, specifically for coding purposes. Flow charts and user-centered design (UCD) diagrams are created using tools like Lucidchart. The UI design is developed using low-fidelity paper prototypes, and user experience (UX) design is examined and designed using Uizard, ensuring agreement among stakeholders. The design process involves identifying the participants, analyzing their relationships, and creating project entities with specific characteristics. The design is continually reviewed for flaws or defects and adjusted as needed. The project design is supported by an entity-relationship diagram (ERD) and guides the development of the database physical design.

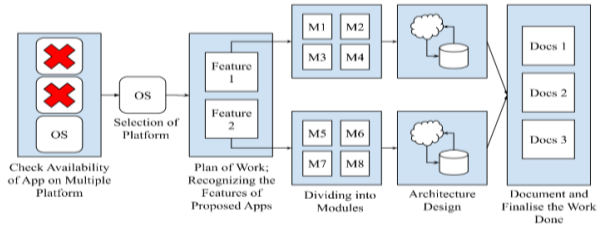


Fig. 3. Design Phase.

3.3 Development Phase

In the development phase of creating a mobile application, the application is coded to implement its functionality. Different modules of the same prototype can be coded simultaneously, focusing on the most important features initially. The development process includes coding for both functional needs and UI requirements. Independent modules can be developed in parallel and later linked together. The interface components should align with the minimal design elements found across different mobile operating systems. Coding also involves handling different functionalities for various user roles, such as administrators and regular users. The prototype phase transfers the documentation from the development phase, marking the experimental period of the mobile application. The architectural plan established during the design phase guides the development process. All the required features and functionalities are implemented in the application, and this progress signifies the fulfillment of the initial part of the third aim of developing the mobile application. Adequate hardware, software, and platforms are provided to support the development activities. Android Studio is utilized for building the application, while Firebase is employed for creating the database.

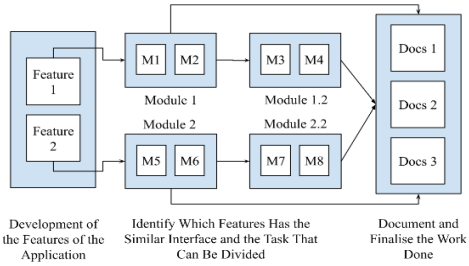


Fig. 4. Development Phase.

3.4 Prototyping Phase

In the prototype testing phase, the functional needs of each prototype are assessed, and the prototypes are tested before presenting them to the client for feedback. Based on the client's input throughout the development phase, necessary adjustments are made. The first and second prototypes are merged, evaluated, and then delivered to the client for further evaluation. This iterative process of development, prototyping, and testing continues until the final prototype is achieved. The client receives the final prototype and provides their input. The work done in the prototype phase is documented and transferred to the testing phase. The objective of the testing phase is to thoroughly assess the functionality of the initial mobile version. Key features and functions such as barcode scanning, payment processing, digitizing, and emailing receipts, and collaborative capabilities are developed in this phase. Each task accomplished during the prototyping process is carefully documented, ensuring a comprehensive record of the development progress.

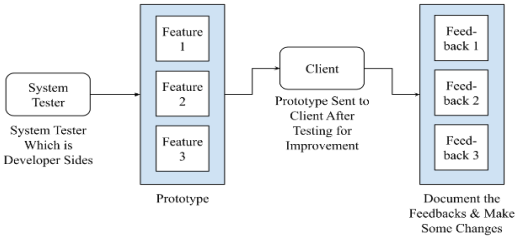


Fig. 5. Prototyping Phase.

3.5 Testing Phase

Testing is a critical component of any development lifecycle model. Before deploying prototypes on real devices, they are initially tested on emulators or simulators provided by the software development kit (SDK). For Android OS development, testing should encompass multiple OS versions and phone models with different screen sizes. Test cases are documented and shared with the client for their review. Once the prototype is completed, the research phase commences. The mobile application is tested in a controlled environment with the participation of twenty individuals. User-centric testing activities are scheduled to evaluate the application's characteristics and user interface (UI), ensuring usability and alignment with requirements and prerequisites. Throughout the testing phase, a combination of tasks and questionnaires is employed to assess the application's features and functions. The System Usability Scale (SUS) is a valuable tool for measuring the overall usability attributes of the new Android application. This comprehensive testing process aims to validate the application's performance and user experience, identifying any areas that require further refinement or improvement.

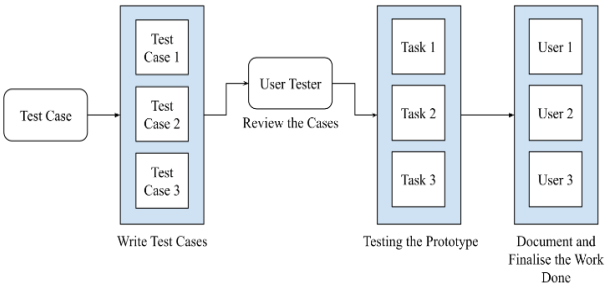


Fig. 6. Testing Phase.

4. RESULTS AND DISCUSSION

A case diagram for the Smart Shopping Cart mobile application (SmartCart) is created using LucidChart which is available online. Due to this mobile application project will be developed for multiple or more than one user to achieve the collaborative goal, the use case diagram will have two actors. The use case diagram in Fig. 7. depicts the interactions between the actors and the process.

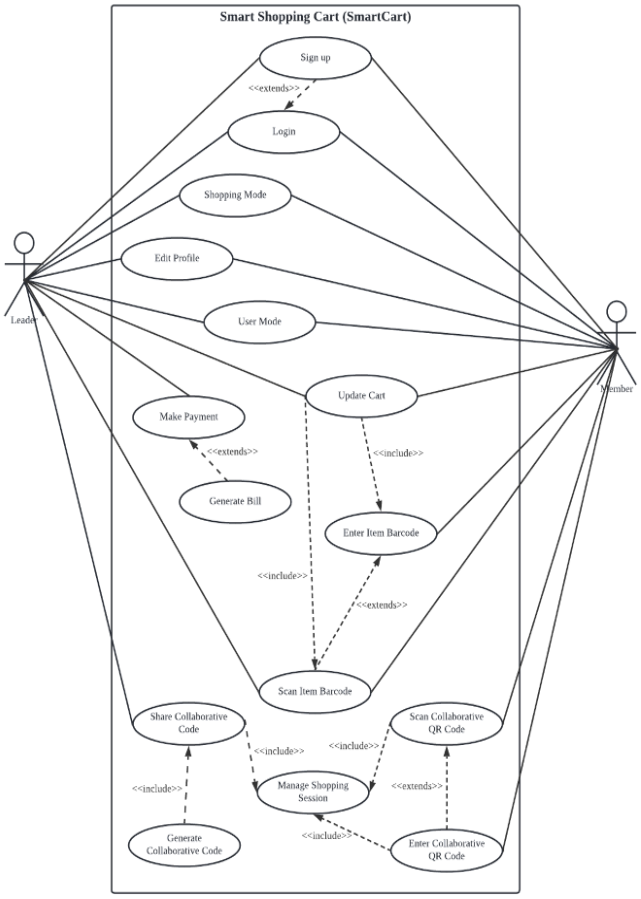


Fig. 7. Use Case Diagram for Smart Shopping Cart Mobile Application (SmartCart).

4.1 Apps Design

4.1.1 Sign-up

The sign-up page is mandatory for unregistered users of the SmartCart mobile application as shown in Fig. 8. It requires necessary information to uniquely identify users and allows them access to the website or app.

Fig. 8. Sign-up page.

4.1.2 Login

Registered users must provide their email and password during the sign-up process for security reasons in the SmartCart mobile application as shown in Fig. 9. New users can sign up by tapping the "Sign up" hyperlink, and those who forget their password can request a temporary password through their registered email.

Fig. 9. Login page.

iPhone X and later users of the SmartCart mobile application have the option to store their data on their device. They can use Face ID recognition for convenient login without repeatedly entering their email and password, simplifying the user experience as shown in Fig. 10.

Fig. 10. Login using Face ID for iPhone.

4.1.3 Edit Profile

The profile edit page allows users to modify certain information, but not their full name, username, or email for security reasons. Users can change their profile picture using various methods and have the option to keep or change their password.

4.1.4 Shopping Mode

Fig. 11 presents the choice for registered users to shop alone or with a group. The wording "Shopping with Myself" is used to avoid feelings of loneliness, while "Shopping with Group" is used to include both friends and family. Pictures are employed to provide a visual understanding of the options, enabling users to grasp the shopping modes before reading the accompanying descriptions.

Fig. 11. Shopping mode page.

4.1.5 User Mode

When users select "Shopping with Group" on the shopping mode page, they are presented with a user mode selection page as shown in Fig. 12. This page allows users to choose their role in the group: leader or member. By tapping the respective buttons ("I am the Leader" or "I am the Member"), users indicate their preference. The inclusion of pictures signifies that the group leader will be responsible for paying for the items on the group members' shopping list at the end of the session.

Fig. 12. User mode page.

4.1.6 Leader of the Group Shopping

This page as shown in Fig. 13 is designed for group leaders in the SmartCart mobile application. They receive a collaboration code to share with their group members. The code can be scanned as a QR code or entered manually. The page displays registered group members with their pictures, allowing for easier identification. The group leader can remove unknown members using the trash can button. After confirming all members, they can proceed with shopping by tapping the "Let's shopping" button.

Fig. 13. Leader of the group collaboration code sharing page.

4.1.7 Member of the Group Shopping

Fig. 14 displays a page for group members in the SmartCart mobile application. Users can scan a QR code using the built-in scanner, or manually enter the collaboration code to join their shopping group. If the device does not support QR code scanning, users can select the option to enter the code manually. By clicking "Enter code manually" on the scanning page, users will be taken to manual mode for code entry.

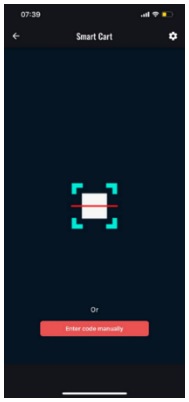


Fig. 14. Member of the group scanning page.

Fig. 15 displays a page in the SmartCart mobile application where group members can select the collaboration code shared by their group leader. The use of a dropdown function makes it easier for users to select the correct code, reducing the need to manually type unfamiliar 6-digit numbers and minimizing data entry errors. After selecting the collaboration code, users can join the group shopping by tapping "Join group shopping" and view the group members.

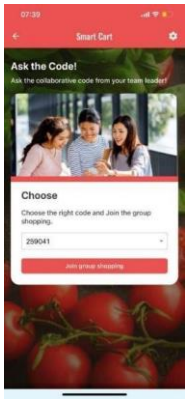


Fig. 15. Member of the group code selection.

Group members can verify their presence in the correct group before proceeding with the shopping session. If all members are confirmed to be correct, they can proceed by tapping the "Let's shopping" button as shown in Fig. 16. In case of being in the wrong group, users can navigate back by tapping the back button located at the top left of the page.

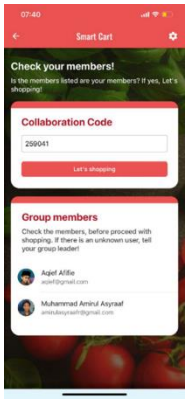
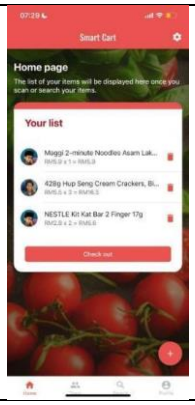


Fig. 16. Member of the group confirmation page.

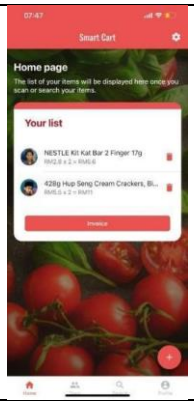
4.1.8 Home Page

The home page displays a list of selected and purchased items by users and group members. Users can add items using the "+" button. Each row consists of a user's profile picture on the left indicating ownership, and a description

of the item on the right. Tapping a row allows item editing. Based on Fig. 17, group leaders have a "Check out" button for payments as shown in (a), while group members can only contribute items without payment access but can go through invoice as shown in (b).



(a) Group leader.

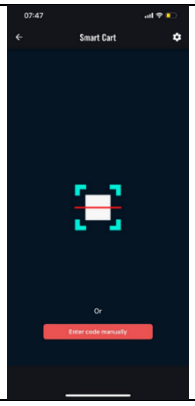


(b) Group member.

Fig. 17. Homepage.

4.1.9 Item Searching

Fig. 18 shown item scanning and product searching page. Users can search for items using a barcode scanner as shown in (a) or manually as show in (b). Based on (b), users are allowed to enter item ID numbers in the search bar. The list updates in real time, displaying item names, IDs, prices, and quantities. A quantity of 0 in pax section means the item is not in the cart, while a quantity over 1 indicates group members have added it. This prevents duplicate entries and excess charges for items.



(a) Item scanning.

(b) Product searching.

Fig. 18. Item scanning and product searching page.

4.1.10 Product Description

Fig. 19 displays a product description page where users can view item details. They can edit quantities by tapping the "+" or "—" buttons or remove items using the "Remove" button. Users finalize their choices by pressing "Add to cart." The page includes a product picture for easy identification, along with the item's name, price per unit, and description. It also provides an item ID and calculates the total price based on the selected quantity.

Fig. 19. Product description page.

4.1.11 Invoice

Fig. 20 is an invoice page where users finalize their item list before making online payments. It consists of four sections. The first section lists all items, allowing users to remove them individually. The second section is for optional tips, with default set at 10% but adjustable by users. The third section displays subtotal, total with tips, and final payment amount. The last section enables users to make payments according to the specified amount.

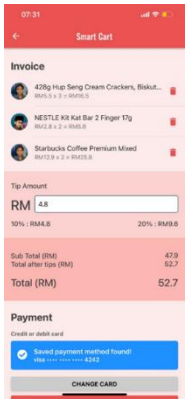
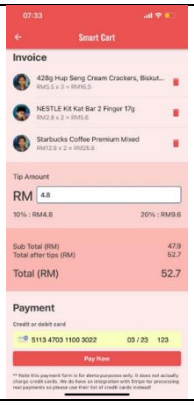


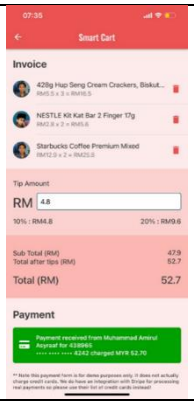
Fig. 20. Invoice page.

4.1.12 Online Payment

Fig. 21 shows interfaces related to payment. SmartCart mobile app payment page as shown in (a), detects users' previous payment methods for convenience, offering the option to reuse credit/debit card details. Users also can easily input card number, expiry date, and CVV/CVC.



(a) Payment page.



(b) Payment received notification.

Fig. 21. Payment.

After entering the CVV or CVC from their credit/debit card, users can proceed with the online payment by tapping "Pay Now." Upon successful payment, a popup message with payment details appears, and users are

directed to the digital receipt page. The use of green in (b) signifies a successful payment, while red indicates an unsuccessful payment.

Due to security purposes, this mobile apps will not be receiving any money from the real visa debit/credit cards. To ensure that only the registered card can be used to perform the payment for the sake of user testing, only the cards that listed in the registered Stripe payment gateway for testing can be used.

4.1.13 Card Scanner Page

SmartCart mobile app offers a convenient feature where users can scan their credit/debit cards using the camera and AI technology. If the numbers on the card are recognized within the rectangular frame, Fig. 22 displays the card number and expiry date. The app then automatically fills in the payment section on the invoice page with the relevant card details, eliminating the need for manual input.

Fig. 22. Card scanning page.

4.1.14 Warning Message Features

The SmartCart mobile app includes a feature that allows users to go back to the previous page before taking any action. Fig. 23 shows a warning message that prompts users to return to the previous page if they accidentally press the wrong button. A pop-up warning will appear to confirm the correctness of the user's actions or indicate that they pressed the wrong button. If they make an error, they can simply press the back button. If no selection is needed, the system will display only an OK button and redirect the user to the relevant page.

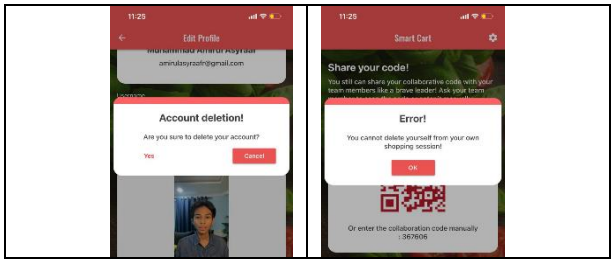


Fig. 23. Warning popup message.

4.2 System Usability Score

The System Usability Scale (SUS) was used to evaluate the usability of the SmartCart mobile application. Table 1 shows an overview of the results given by respondents on the usability of the SmartCart mobile application from their perspective using SUS tools and methods.

Table 1. Overview of the Respondent's Feedback.

R	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score
1	5	1	5	1	4	2	5	1	5	2	92.5
2	4	1	4	1	3	2	4	2	4	2	77.5
3	5	4	5	4	4	4	5	2	5	1	72.5
4	4	1	4	2	2	3	4	1	3	1	72.5
5	4	3	4	2	3	2	4	1	4	3	70
6	4	3	4	2	3	2	4	2	4	2	70
7	4	2	4	2	3	4	3	2	4	2	65
8	4	2	3	3	4	3	4	3	4	2	65
9	4	3	4	2	4	3	4	4	4	4	60
10	4	4	5	5	5	4	5	4	5	4	57.5
Average Usability Score											70.25

SUS Score will be calculated using the following formula which is universally accepted in the HCI domain looking into the usability and effectiveness of system design and performance [53].

X= (Sum of the points for all odd-numbered questions) – 5

Y= 25 – (Sum of the points for all even-numbered questions)

SUS Score = (X + Y) x 2.5

Out of 15 participants, only 10 provided SUS feedback. On average, the respondents rated the application as usable with a score of +2.25, surpassing the required average of 68. Scores below 68 indicate design flaws in navigation, organization, labeling, or search processes that need investigation and improvement, while scores above 68 suggest the need for modest changes in information architecture and User Interface (UI) design. The SUS score system categorizes usability into excellent, good, OK, poor, and awful.

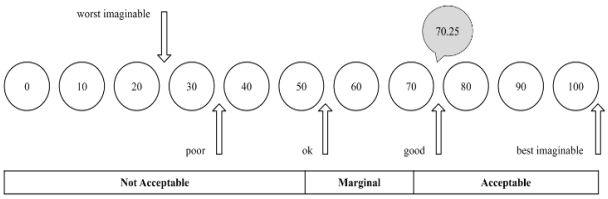


Fig. 24. SUS Acceptability Score for SmartCart Mobile Application.

Based on the indicators as shown in Fig. 24, the SmartCart application falls within the acceptable range with the score of 70.25, reflecting its overall usability. However, it is important to address any design flaws and make necessary improvements to enhance the user experience further.

5. CONCLUSION

The SmartCart mobile application offers significant benefits by allowing users to scan items with their own smartphones and share the bill, eliminating the need for a single registered device and saving valuable shopping time. Tested by over 10 users from diverse backgrounds, the app has proven to be highly usable and effective. The SmartCart project aims to achieve its objectives and foster a tech-savvy generation even in routine tasks like shopping.

SmartCart is a collaborative shopping cart system with potential for enhancements to improve user experience. One improvement is introducing a loyalty points system, rewarding customers for shopping through the app and offering higher points for using collaborative mode, thus encouraging group shopping. Adding more e-wallet options such as GrabPay, ShopeePay, and DuitNow will expand payment flexibility. GrabPay also offers its own loyalty points, adding further incentive. DuitNow facilitates easy cashless transactions for Malaysians, allowing payments from any bank account. Additionally, incorporating multiple language options beyond English and enabling users to access old receipts from previous shopping sessions will greatly enhance the app's functionality and user satisfaction.

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