MOTHERHOOD MADE EASIER: THE NANNY CARE MOBILE APPLICATION FOR POST-NATAL WOMEN

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ABSTRACT

The Nanny Care mobile app has accomplished a significant mobile development application targeted at post-natal women. This app aims to solve the challenges post-natal women face in accessing reliable and safe confinement care services. Additionally, it creates a golden opportunity for the confinement ladies to promote and provide their confinement services to the targeted customers. On the other hand, this study follows the Extreme Programming (XP) methodology, which focuses on iterative development and continuous customer feedback. Specifically, this app allows post-natal women (users) to register and log in, view confinement ladies' profiles, book services, view past bookings, and rate confinement ladies. Based on the usability evaluation of the app, it has shown that users found it helpful, easy to use and efficient. The users' feedback highlights the app's strengths and suggests areas for improvement, such as additional features and better error handling. Overall, this Nanny Care mobile app has the potential to enhance the post-natal women's confinement experience, empowering confinement ladies to offer their services and providing a reliable platform for accessing and providing quality care.

Keywords: Nanny Care Mobile App, post-natal women, confinement ladies, Extreme Programming, usability evaluation.

INTRODUCTION

The childbirth process holds tremendous significance throughout different cultures worldwide and is accompanied by various culturally specific rituals and customs. Specifically, becoming a mother brings about profound changes in women's lives, rendering them exceptionally susceptible during the post-natal (after birth) time. For instance, an established tradition called "confinement" is a famous term related to the duration after childbirth among post-natal women in most Eastern societies. Commencing after birth, this tradition entails complete and extensive support provided by family and caregivers within the home. The primary goal behind such assistance revolves around ensuring adequate rest for mothers and proper dietary intake while simultaneously fulfilling newborn care obligations and adhering to relevant confinement practices designed to promote warmth (Cleveland Clinic, 2022).

Despite living in urban areas or being separated geographically from their families, post-natal women frequently find themselves lacking the support of family members or access to a professional caregiver known as a confinement lady. This situation requires seeking several alternative methods for obtaining proper post-natal care and support – one common approach being through social media platforms like Facebook and Instagram. However, caution should be exercised since relying on these channels may pose reliability and safety risks. Disappointingly, there have been documented incidents where mothers received substandard care from hired professionals in confinement centres. For instance, a recent case in Selangor involved a confinement lady who actively hindered a mother's breastfeeding efforts and forcefully introduced formula to a newborn baby who was only a few days old (Bernama, 2021).

To address these challenges, the introduction of 28days.com has been proposed. It is the first online confinement care services platform in Malaysia. It has been proven to be a valuable resource for mothers (28Days, 2019). Throughout this platform, mothers can choose the services they desire and have access to trustworthy ratings and reviews. However, it is essential to recognise that websites alone may not completely ease mothers' concerns nowadays, especially in this technological age. Hence, this study's proposed mobile application development would allow them to easily book confinement services and provide feedback afterwards to support these mothers greatly. In short, developing this application would prevent mothers from unknowingly selecting inappropriate services or confinement ladies. Ultimately, it gives them peace of mind and ensures a safe and dependable confinement experience.

BACKGROUND AND RELATED STUDIES

An extensive explanation of the background and relevant studies concerning prevailing systems for finding confinement ladies are discussed and provided in this section. These systems generally encompass diverse methods such as Instagram, websites, and applications. The primary goal is to thoroughly comprehend the current landscape of platforms facilitating the search for confinement ladies while identifying their advantages and disadvantages.

The search for confinement ladies has tremendously impacted post-natal women - primarily those residing in urban settings or those distant from supportive family members during their recovery phase. Across various cultural backgrounds, there is a great reverence towards safeguarding new mothers during their vulnerability after childbirth, thus giving rise to a widespread practice of self-imposed isolation termed "confinement." These practices involve providing comprehensive assistance and care within the confines

of their homes, prioritising the mother's well-being through adequate rest, proper nutrition, and adherence to specific customs outlined for this particular period.

In the traditional sense, confinement ladies were typically found through personal networks, family connections, or recommendations from trusted sources. However, as technology has advanced and society has changed, the search for confinement ladies has now transitioned to digital platforms. The digital media include Instagram, website and application. Specifically, the finding for confinement ladies can be done through Instagram, dedicated websites such as "Pantang Plus", and applications like "Confinement-Mommy Genius", discussed in the following subsection.

A.   **Instagram**

Typically, using Instagram as a digital platform to find confinement ladies involves utilising the platform's popularity and broad reach by society. The results obtained from Instagram searches for confinement ladies are presented in Figure 1 as follows.

Figure 1

Results from an Instagram Search
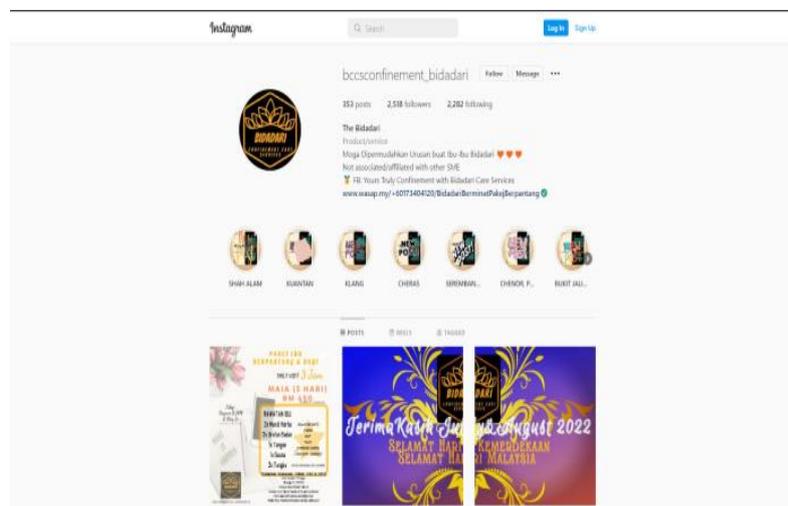
One of the advantages of Instagram to businesses and entrepreneurs is the opportunity to expand their operations while engaging in marketing activities. This is done by sharing feedback from previous customers on their profiles, indirectly providing users with valuable insights. Furthermore, businesses can showcase their confinement lady services through real videos on Instagram. However, it is important to note that Instagram does not offer detailed ratings for each confinement lady, which may limit the options available and result in a smaller selection for users.

B.   **Website "Pantang Plus"**

An alternative approach has been investigated by utilising a dedicated online platform called "Pantang Plus" (PantangPlus, 2023), shown in Figure 2.

Figure 2

*Results from the Pantang Plus website:*

This platform is used to locate confinement ladies. Also, this platform specialises in connecting users with confinement ladies nearby. It offers extensive information regarding various packages, costs, and services for mothers and babies. Users can make more informed decisions regarding their selection process by accessing details on service offerings and pricing options through this platform. Nevertheless, a drawback of using this website is that it needs to disclose specific qualifications or experience details of the confinement ladies, making it difficult for users to assess their capabilities thoroughly. Moreover, the inability to view feedback or ratings left by previous clients further limits users' capacity to make informed choices.

C.   Application "Confinement-Mommy Genius"

Another approach that has been studied involves the "Confinement Mommy Genius" application (Khai li, 2020). The notable app serves as a valuable resource for individuals seeking guidance during their confinement period while also offering a platform for searching esteemed confinement ladies as illustrated in Figure 3.

Figure 3

Result from the "Confinement Mommy Genius" application
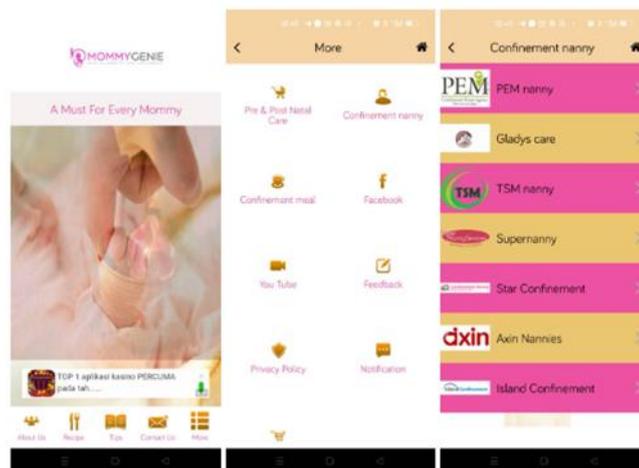
This well-designed application allows users to conveniently browse various businesses on its platform and gather detailed information regarding their relevant services. Apart from being an informative tool, this application goes above and beyond by providing additional features like food delivery options and recipe suggestions tailored towards enhancing user convenience throughout their confinement journey. However, it is worth mentioning that one of the limitations associated with this application is the absence of a direct booking functionality for confinement ladies. Furthermore, users cannot provide valuable reviews or feedback about their experiences with these confinement ladies. Thus, it has missed an opportunity to assist other potential users needing recommendations. Based on the above three digital platforms, a summary of the advantages and disadvantages of each digital platform is provided in Table 1 as follows.

Table 1

Summary of Advantages and Disadvantages of the Existing Digital Platforms

Digital Platforms	Advantages	Disadvantages
Instagram	1. Ables to view feedback from previous customers if it is posted through the application. 2. Ables to view real videos of services from confinement lady.	1. Does not provide a detailed rating of every confinement lady. 2. Only has a limited number of videos.
Website	1. Provides users with a wide range of information regarding packages, prices and coverage areas. 2. Offers both free consultations and visits.	1. Does not provide the details of the confinement lady to the user. 2. Does not provide the feedback and ratings of the confinement lady.
Mobile application	1. Provide food delivery and recipes for users.	1. Does not allow users to book directly from the application. 2. Is not able to give review or feedback.

In brief, digital platforms such as Instagram, dedicated websites like "Pantang Plus " and applications such as "Confinement Mommy Genius" have emerged in the quest for confinement ladies. Also, these digital platforms render a range of benefits and limitations for individuals seeking confinement services. Only a little work or research has been done to enhance these digital platforms to target post-natal women users. Although Instagram offers businesses a platform to showcase their services and allows users access to feedback and videos, it needs more comprehensive ratings and might have limited options. On the other hand, dedicated websites like "Pantang Plus" offer complete information about confinement services but do not disclose specific details about the confinement ladies or furnish feedback from past clients. Applications like "Confinement Mommy Genius "give various resources to facilitate the search process but need more features for direct bookings and user feedback. To simplify, these digital platforms must provide users transparency regarding reviews and feedback. Thus, gaining insight into these existing systems is crucial when developing an innovative platform that is easy to use for those searching for a suitable confinement lady.

METHODOLOGY

The project's development has chosen the Extreme Programming (XP) framework as its methodology, widely used in designing digital platforms (Amir Azimi, 2017).

XP is specifically designed to cater to the distinct needs of software development by small teams facing ambiguous and evolving requirements. This approach offers numerous advantages, such as rapid development, user-friendliness, safety, flexibility, predictability, a scientific approach, and a pleasant development experience. The efficient development process within the XP framework is depicted in Figure 4 as follows.

Figure 4

Extreme Programming (XP) Methodology
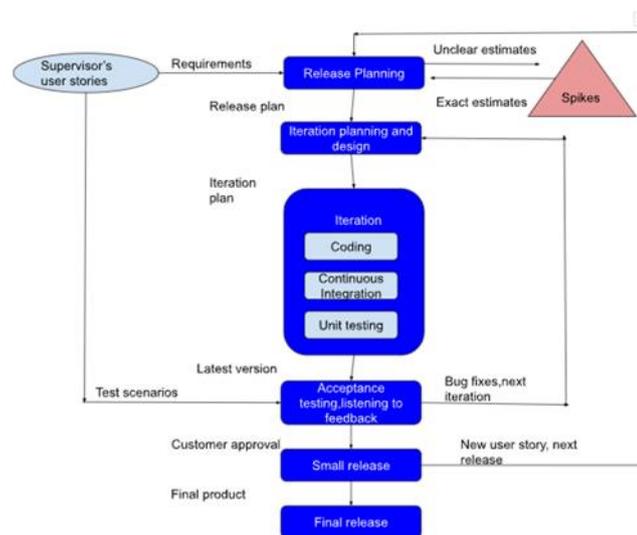
Generally, five iterative steps are involved: planning, designing, coding, testing and listening, which are listed as follows.

Step 1: Planning

In this initial stage, user stories describing their envisioned results determined the desired outcomes. These requirements are broken down into iterations necessary to complete all required functionalities. The proposal is the deliverable of this stage.

Step 2: Designing

This step covers the requirements collected during planning, in which a solid foundation for system design is established. Also, designing artefacts like context diagrams, entity relationship diagrams, data flow diagrams, and data directories helps to understand how information should flow through the system. These graphical representations guide interface creation.

Step 3: Coding

During this stage, specialised XP techniques such as continuous integration come into play when writing the actual code. The code has undergone review to ensure alignment with the requirements and enable identification of necessary changes.

Step 4: Testing

Multiple testing processes are applied to the planned project to identify potential issues or bugs. In addition, the system is carefully evaluated to verify that it meets user requirements. Any faults discovered are promptly addressed and resolved. Notably, testing takes place during the development phase in XP rather than afterwards.

Step 5: Listening

An integral principle of XP is continuous customer interaction through feedback loops. Some commentary gathered helps refine requirements and form a foundation for innovative designs. This cycle repeats, facilitating continuous improvement and adaptation throughout the development process.

To simplify, adopting the XP framework has led to numerous benefits to the project due to its iterative and customer-centric approach. This methodology guaranteed that the project had been advanced through various stages, including planning, designing, coding, testing, and listening. Consequently, it enabled a quick adaptation to change the requirements and continuous user feedback. Such an iterative and collaborative approach has significantly improved the overall quality and success of the software development process.

Design and Development of Nanny Care Mobile App for Post-Natal Women

The discussion on the creation and progress of a Nanny Care mobile app for Post-Natal Women is elaborated in this section. The development process adhered to the five steps above of the XP Programming methodology. This section is divided into two subsections: (1) exploring the requirements of the Nanny Care mobile app and (2) building a prototype of the application to showcase the identified requirements.

To develop a mobile app, the following requirements-gathering processes are carried out. This process involved two methods: (1) gain input from the potential users, who provided valuable insights and guidance, and (2) conduct research on existing systems and apps through online sources that use the Google search engine. The main goal of this process was to collect essential information and extract requirements based on the features and functionalities of the existing mobile application.

Method 1: Input from potential users

The guidance from the potential users who generously offered valuable insights and recommendations regarding the desired features and functionalities for the mobile app. In-depth discussions were conducted to gather comprehensive information on specific requirements such as user registration, login functionality, and others.

Method 2: Research on Existing Systems and Apps

To enhance the requirements-gathering process, a thorough investigation has been carried out on the various Nanny Care mobile applications that are currently accessible through online sources. This analysis has completed an extraction of additional requirements and features commonly observed in widely used existing applications.

From these two methods, the requirements that served as the foundation for determining the functionalities and features of the Nanny Care mobile app have been done. Table 2 presents a comprehensive list of the essential requirements and their priorities.

Table 2

List of Requirements for Nanny Care Mobile app for Post-Natal Women

| Requirement ID	Requirements Description
1	**into the user profile and log out.**
.1-1	The user (postnatal women/confinement lady) should log into the administrator account.
1_2	The user (postnatal women/confinement lady) should be allowed to reset the password.
.1_3	Users (postnatal women/confinement ladies) can log out anytime.
.2	**Register user profile. View registered accounts**
.2_1	Users (postnatal women/confinement ladies) should register their profile with a profile picture included.
.3	**View confinement lady**
.3_1	Users (postnatal women) view all confinement ladies.
.4	**View profiles**
.4_1	Users (postnatal women) view the confinement lady's profile details.
.5	**Book confinement lady**
.5_1	Users (postnatal women) should be able to book selected confinement lady's services.
.6	**View past bookings**
.6_1	Users (postnatal women) should be able to view their past bookings and details.
.7	**Rate confinement lady**
.7_1	Users (postnatal women) should be able to rate their confinement lady after the whole process.
.8	**Booking Approval**
.8_1	The user (confinement lady) should be able to view all the bookings they received.
.8_2	The user (confinement lady) should be able to accept or decline the bookings.
.9	**Create services**

| 9_1 | The user (confinement lady) should be able to create the services with the name and the price per day received. |
| 9_2 | The user (confinement lady) should be able to edit and update the services. |

To convert the outline requirements in Table 2 into functional elements of a computer system, a visualisation and modelling process is necessary to utilise suitable methods and tools. This study selected Unified Modeling Language (UML) as the preferred modelling technique due to its effectiveness in such applications. The chosen approach comprised three primary types of diagrams: use case diagrams, activity diagrams, and class diagrams, representations capable of depicting the behavioural and structural facets of the designed mobile app. Within the confines of the current study, the two interactive diagrams, namely use case and activity diagrams, drawn using the draw input-output (I/O) application, were chosen to portray the underlying system's structural components accurately.

Nine essential use cases have been identified as depicted in Figure 5: Login into user profile and log in, Register user profile, View registered accounts, View confinement lady, View profiles, Book confinement lady, View past bookings, Rate confinement ladies, Booking Approval, and Create services. These use cases cover the main functionalities and features of the app.
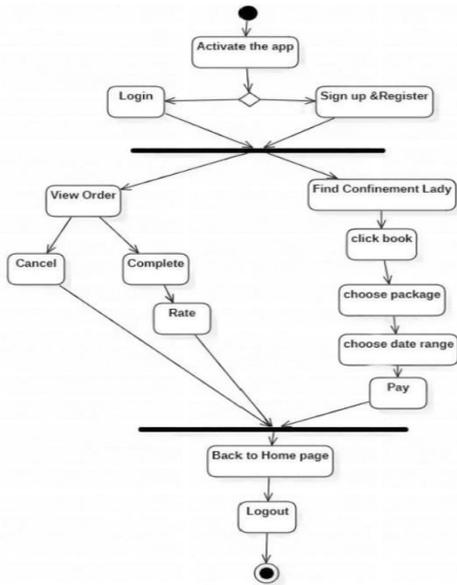
Figure 5

A Nanny Care mobile app for Post-Natal Women Use Case Diagram
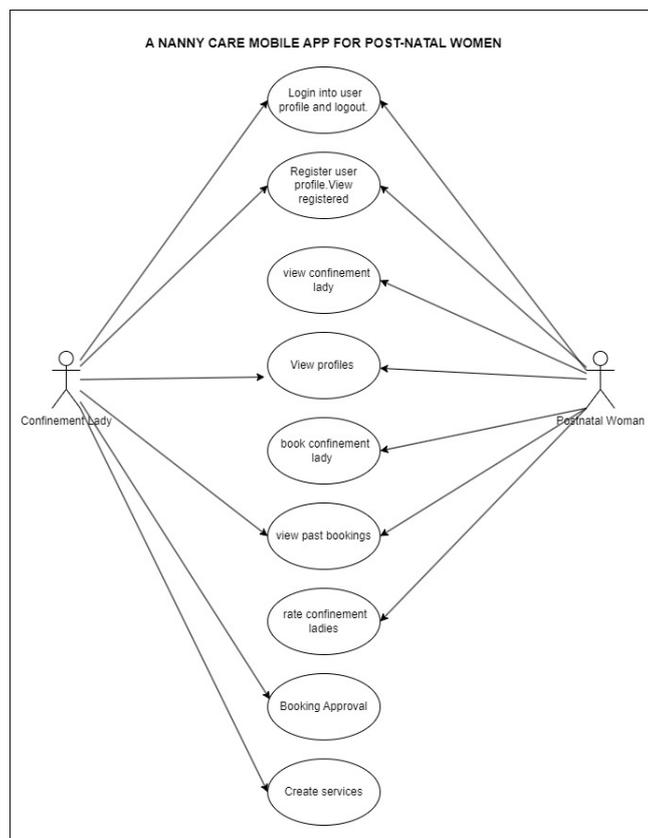
Meanwhile, Figure 6 and Figure 7 illustrate a Nanny Care mobile app for the Post-Natal Women Activity diagram (Post-Natal Women only) and a Nanny Care mobile app for the Post-Natal Women Activity diagram (Confinement Lady only), respectively.
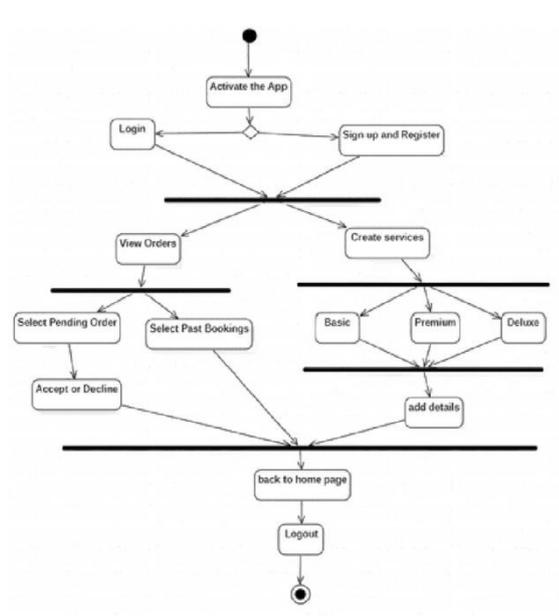
Figure 6

A Nanny Care Mobile App for Post-Natal Women Activity Diagram (Postnatal Women only)
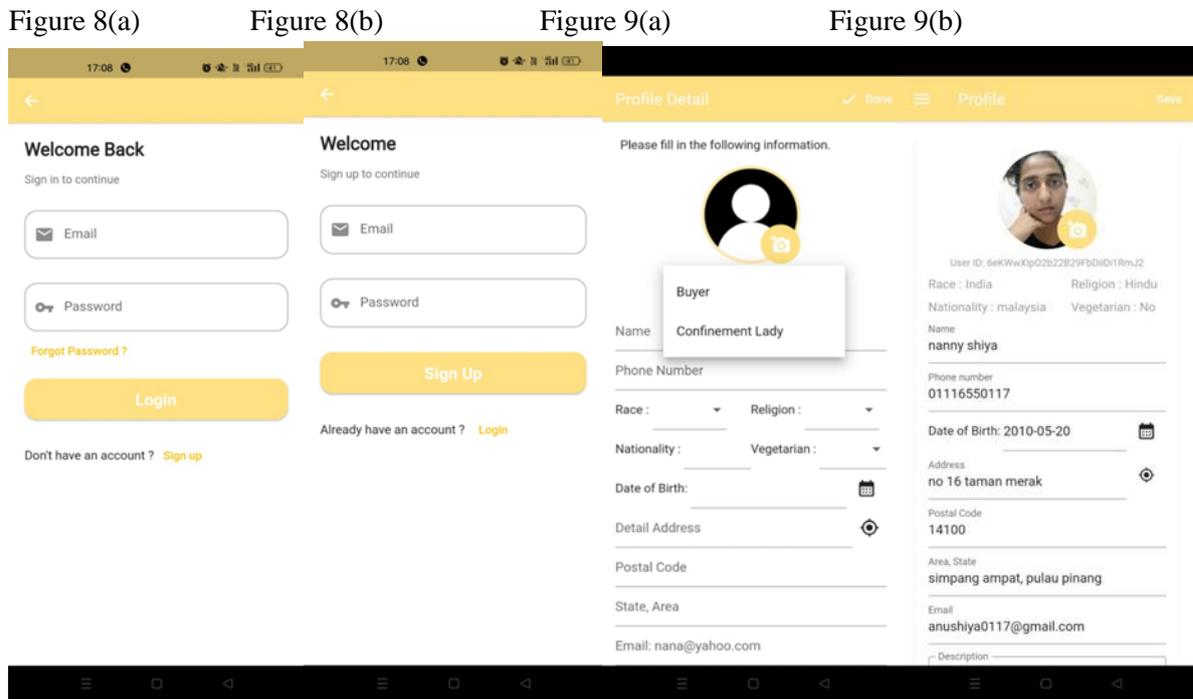

Figure 7

A Nanny Care Mobile App for Post-Natal Women Activity Diagram (Confinement lady only)

Nanny Care's prototype was created to demonstrate the discussed requirements for a mobile app targeting post-natal women. Prototyping software is commonly used to exhibit software requirements and acquire user feedback based on their interaction with the prototype during development. The Android Studio was the primary integrated development environment (IDE). The Firebase development platform facilitated essential functions like user authentication and database management for data storage. To offer an insight into the visual design and user interface of the Nanny Care app, relevant screenshots are included in Figures 8, Figure 9, Figure 10 and Figure 11, as shown in the following section.

Figure 8

Interface for login (a) and sign up (b) and Figure 9. Interface Registration (a) and a registered profile (b) respectively.

Figure 8(a)   Figure 8(b)   Figure 9(a)   Figure 9(b)

Figure 10

Interface Postnatal Woman Homepage (a) and the booking history (b) and Figure 11. Interface for booking process(a) and a booking progress page (b)

Figure 10(a)   Figure 10(b)   Figure 11(a)   Figure 11(b)
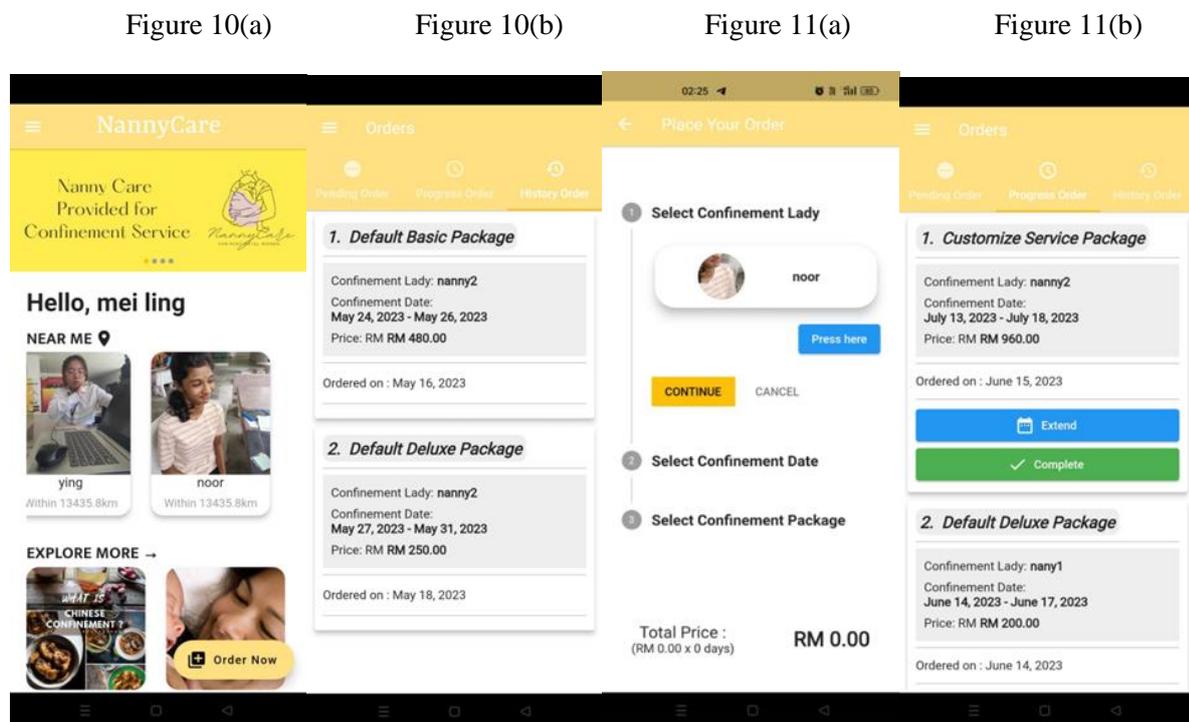
RESULTS AND DISCUSSION

A usability evaluation was conducted with ten respondents: five confinement ladies and five post-natal women. The respondents were contacted through personal meetings and calls. The Nanny Care mobile app for Post-Natal Women's high-fidelity prototype and a post-task questionnaire have been used to conduct the assessment.

The post-task questionnaire consists of 20 items in five sections. Section A collected demographic information, while Section B assessed the respondents' opinions on the application's Interface Design using a five-point linear scale (1 representing "Strongly Disagree," and five representing "Strongly Agree"). Section C evaluated the application's usability (functionality) using the same scale as Section B. Then, in Section D, the respondents were asked about the application's ease of use using linear scale questions. Finally, in Section E, the general feedback from the respondents is collected.

The respondents performed the following step-by-step procedure for the evaluation as follows.

(1) Demonstrating the application.

(2) Having the respondents interact with the application as the experimental procedure outlines.

(3) Having the respondents complete the post-task questionnaire.

Specifically, each user type accounted for 50% of the respondents, with five individuals in each category based on the usability above evaluation. The age range of the respondents varied from 21 to 50 years old. Most participants, representing 50% of the total, were between 31 and 40. The next largest group comprised individuals between 41 and 50, making up 30% of the respondents. Only two respondents fell into the age range of 21 to 30, accounting for 20% of the total. Notably, no respondents were in the age range of 11 to 20. These demographics illustrate a diverse sample that includes different user types and age groups, allowing for a comprehensive evaluation of the Nanny Care mobile app's usability for post-natal women.

Next, the feedback for the interface design of the Nanny Care mobile app is done. According to the data tabulated in Table 3, a significant proportion of the participants expressed contentment with both the colour and layout of the application, which stood at 70% each. Moreover, an overwhelming majority, which reached 90%, found the text effortlessly legible. Furthermore, a considerable % of respondents, constituting 70%, deemed the app's design user-friendly. Additionally, 80% agreed that the chosen font type and size were appropriate. These observations collectively demonstrate an overall positive reception while acknowledging minor recommendations for enhancement in specific aspects.

Table 3

Results for Section B: The Interface Design of the Nanny Care mobile app

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1. Were you satisfied with the colour used in the app?	0(0%)	0(0%)	3(30%)	2(20%)	5(50%)
2. How about the layout of the app is neat and pleasant.	0(0%)	0(0%)	3(30%)	6(60&)	1(10%)

3. Did you find reading the text in the app easy?	1(10%)	0(0%)	0(0%)	3(30%)	6(60%)
4. Do you think the design of the app is user-friendly?	0(0%)	0(0%)	3(30%)	6(60%)	1(10%)
5. Is the font type and size suitable for this app?	2(20%)	0(0%)	0(0%)	4(40%)	4(40%)

The responses from Sections C, D, and E were categorised as post-task questionnaires, which were analysed to ascertain respondents' opinions, especially regarding the functionality and user-friendliness of the Nanny Care mobile app for Post-Natal Women.

The data extracted from Section C demonstrated an overwhelmingly positive reaction towards usability in terms of functionality. Respondents expressed that the app proved valuable daily (90% agreement). It was assisting them in becoming more efficient (60% agreement). While also recognising its potential for time-saving purposes (80% agreement). Additionally, respondents recognised that it simplified tasks (90% agreement) and met their expectations accordingly (80% agreement), as shown in Table 4.

Table 4

Results for Section C: The Usability (functionality) of the Nanny Care Mobile App

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
6. Did you find the app useful in your daily life?	0(0%)	0(0%)	1(10%)	4(40%)	5(50%)
7. Did you feel it helped you be more effective?	0(0%)	0(0%)	4(40%)	4(40%)	2(20%)
8. How do you feel that "The application can save my time."	0(0%)	0(0%)	2(20%)	3(30%)	5(50%)
9. Does it make the thing that I want to accomplish easier to get done?	0(0%)	0(0%)	1(10%)	5(50%)	4(40%)
10. Does it do everything that I would expect it to do	0(0%)	0(0%)	2(20%)	2(20%)	6(60%)
11. Has it been beneficial in reducing my burden	0(0%)	1(10%)	1(10%)	4(40%)	4(40%)

Meanwhile, Section D focused on ease of use, with respondents holding a favourable view, as shown in Table 5. The respondents found the navigation through the app is straightforward (100%), resulting in quick task completion (70%) while also offering an easy error recovery option (100%). The majority also articulated that using the app required minimal effort (80%), with few needing technical support (80%)

Table 5

Results for Section D: The Usability (functionality) of Nanny Care Mobile App

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
12. I thought the application was easy to use.	0(0%)	0(0%)	0(0%)	5(50%)	5(50%)
13. I was able to complete the tasks quickly using this application.	0(0%)	1(10%)	4(40%)	3(30%)	2(20%)
14. I could recover easily and quickly whenever I made a mistake.	0(0%)	0(0%)	0(0%)	4(40%)	6(60%)
15. Using it was effortless.	0(0%)	1(10%)	1(10%)	3(30%)	5(50%)
16. I do not need a technical person's support to use this system.	1(10%)	0(0%)	1(10%)	3(30%)	5(50%)

Overall, this data showcases a high level of satisfaction with both the functionality and ease of use provided by this app, resulting in sections C and D, respectively. This suggests a positive overall response from respondents who express substantial contentment regarding the Nanny Care mobile app for Post Natal Women as valuable and straightforward to operate effectively by respecting principles established by individuals or groups. Meanwhile, Section E provides the collected general feedback from the respondents as tabulated in Table 6.

Table 6

Results for Section E: The general feedback of the Nanny Care Mobile App

	Poor	Fair	Good
17. How would you rate the overall quality of the app?	0(0%)	2(20%)	8(80%)

From the collected results, it has been shown that the quality of the app is good, achieving 80%. The app is considered valuable and easy to use. In addition, users expressed satisfaction with its feature for creating and managing, finding the registration, login, search, and reminder setting processes simple and valuable. The app's intuitive interface and attractive appearance were well-received. Also, users rated the overall quality positively and praised its convenience for booking and accessing services. Overall, the feedback provided valuable insights for enhancing functionality and user experience in the future.

CONCLUSION

The Nanny Care mobile app for Post Natal Women has undergone some assessments and emerged as a valuable and user-friendly solution. The feedback gathered from respondents indicated their contentment with various aspects of this app, including its visual interface, smooth navigation experience, and intuitive usage, which made it unnecessary for them to rely on written instructions. Furthermore, they found it easy to retain information about how to use this application effectively. Nonetheless, users highlighted areas requiring improvement, particularly regarding additional features and increased availability of learning materials and error-handling resources. Despite these suggestions for enhancement, most respondents acknowledged the app features' convenience during their evaluation process and its clear organisation. They considered everything while allowing room for further development in certain areas. Users displayed overall satisfaction with both the functionality and aesthetic appeal of the Nanny Care mobile app. The feedback collected proved invaluable when making future updates and enhancements.

In summary, the primary purpose behind developing the Nanny Care mobile app was based on the commitment towards delivering an efficient and dependable solution tailored specifically towards mothers seeking professional confinement care services. The central idea focused on providing convenience by streamlining the process of finding and booking trusted confinement ladies while mitigating any risks related to fraudulence or abuse through its user-friendly interface and intuitive navigation. The app enhances post-natal women's overall confinement experience, ensuring their mental tranquillity and physical security. The valuable inputs received from our users shall serve as a strong foundation for future updates and improvements, thus enabling the app to understand better and fulfil the needs and preferences of its esteemed user base. The true potential of the Nanny Care mobile app lies in its ability to revolutionise post-natal women's access to high-quality confinement care services. They render it an invaluable tool for mothers and the entire post-natal care industry.

ACKNOWLEDGEMENT

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