Developing home health care application for patient during the covid-19 pandemic

A A J Permana, I G P Sindu, I M Pageh
Informatics Engineering, Faculty of Engineering and Vocational, Universitas Pendidikan Ganesha, Singaraja, Indonesia
Historical Education, Faculty of Law and Social Sciences, Universitas Pendidikan Ganesha, Singaraja, Indonesia
agus.aan@undiksha.ac.id, partha.sindu@undiksha.ac.id, made.pageh@undiksha.ac.id

Abstract. The term “Priyayi” or willing to be served in Indonesia as a social context really encourages start-up developers to develop products. Also, Covid-19 pandemic makes people anxious to visit hospitals or “Puskesmas” (Community Health Care Service). The development of home care applications is prospective in Indonesia, especially in Singaraja, Bali. It greatly assists the community to get health services in their homes so that it is safer and more comfortable than queuing for services at hospitals and clinics. This research is descriptive qualitative research. The applications are developed using the Agile Method. The data is obtained through observations, interviews, and previous scientific research and study. Based on the results of interviews, 80% of respondents wanted the development of this application. Furthermore, the result of Alpha testing showed that the system could ran well. The usability Testing Process used the System Usability Scale (SUS) questionnaire with 20 respondents resulted in a “Good” value (65.125) so that this application followed the needs of people who want to get health care at home during the Covid-19 pandemic.

1. Introduction
In the 4.0 technology and information era, the internet is connected to various devices and can provide various conveniences to the community. The development of technology in generation 4.0 brings convenience to human life. With more and more advanced technology-based services, people can easily fulfill their needs quickly and practically.

Internet technology, which was the result of World War II, eases the cyber world exploration using websites. Websites are connected thus anyone who has an internet connection can communicate anytime and anywhere. Mainframe computers (large computers) have also evolved into Personal Computers (PCs), Laptops, Tablets, Mini Tablets, and Smartphones. Smartphones make internet connection and web connection easier, due to the increasing capabilities of the devices at the hardware, software, and features levels.

The explosion of the Indonesian population, which has now reached 250 million, opens opportunities to offer various businesses and services via the internet and the web (Smartphone). Based on data from the e-marketer Digital Marketing Research Institute in 2018 showed that there were more than 100 million active smartphone users, bringing Indonesia to become the fourth Smartphone user country after China, India, and America [1].
Based on field observations, the number of Smartphone users has a positive impact on the Startup to develop smartphone-based applications that can be used to help people, such as Matahari Mall, GoJek, Bukalapak, Tokopedia, AiryRoom, etc. Those applications are familiar among Indonesian citizens. The new startup keeps coming to support local products such as Codapay (cut credit for payments), HijUp (modeling for Muslim women), IDNtimes.com (youth trend), Jarvis Store (Online Shop), Ruang Guru (Online learning), Talenta (employee attendance management), etc.

The satisfying service makes customers are willing to pay more and even makes them feel like a "new Priyayi in the Postmodernism era". International products and logos that are used as a symbol of the modernism does not act as a symbol of luxury anymore. For example, it was used to be a luxury and felt like priyayi when eating at KFC and McD. From a social point of view, the term priyayi appeared in Java. It is a term for a noble family belonging to kraton relatives who received Dutch education [2]. Feudal attitude refers to behavior that always wants to be respected, and always wants to be served, holding on to old values that have been abandoned [3]. Many of the rich people today have a priyayi attitude, which are willing to be served, giving unnecessary comments, and having a high consumptive character.

Postmodern spreads through video and computer technology. This can be seen from several films and television shows; the internet is a good example of this era [4]. Postmodern society is part of a more visual society (viewing society) because it is dominated by television and the internet. Nowadays, it is difficult to distinguish between real and fictional, for example, many robots face now resemble real humans. Many cannot distinguish between humans and robots through visual displays, like the one portrayed in the film ‘The Matrix’.

In addition to postmodernism, currently, there is a new era called the pandemic era. This was caused by the Covid-19 virus, which was first detected in the city of Wuhan in China in January 2019. On March 2nd, 2020, the Indonesian government announced the first case of Covid-19 that caused activity restriction and implementation of health protocols. People are afraid to visit clinics and hospitals for fear of contracting Covid-19. The most frightening sight is that the rate of transmission of the Covid-19 virus in Indonesia, especially Bali, is very high. The pandemic is still raging and it is unclear when it will end. Even though governments in all countries have issued regulations regarding health protocols, new cases are still reported. The alarming situation in Indonesia is the death of medical personnel and paramedics due to contracting the coronavirus. This makes Indonesians anxious, panicked, and makes them afraid to leave the house, socialize, and gather round. For healthy people, the situation is still tolerable. But not with unhealthy people who need treatment but are afraid to go to the hospital or clinic. The solution to this problem is by providing Home Care services. The community remains safe and comfortable at home thanks to this home care service [5]. The community can enjoy light treatments such as blood pressure checks, blood sugar checks, wound care, cleaning wounds after surgery, and handling minor illnesses that can still be done at home.

Based on observations of home care services carried out by hospitals and clinics using the chatting application and forms, it was found that in the pandemic era, the community strongly supported the development of a health service in the form of Home Care Clinic, an online-based services that can be accessed via Smartphone, to provide intense care to the general public at home and office or anywhere else without demanding the patient to wait and crammed in hospitals and health clinics. It is possible to develop technology-based health services in Indonesia to provide health services to patients such as care, health education, or safe and effective remote health monitoring[6][7]. Patients can download the application and install it on a Smartphone and then order services, connect directly with doctors, receive care and treatment directly at home. Home Care is a service commonly used in America since the 19th century[8]. Home Care can also bring sanctification for the senior community to obtain care and improve their quality of life [9]. The main purpose of this service is to provide health care to help the community. Health care consists of two types, namely medical and non-medical measures.

Home Care is a home medical service [10] which provides information on care and therapy services at home for patients with diabetes care, blood pressure checks, breathing apparatus, wound care after surgery and childbirth, or health care according to the need of the patient. This is done to help patients
receive intensive care in their homes, by first entering the patient's home coordinates [11]. Hospital treatment also has a psychological impact on patients. By treatment from home, the patient feels less depressed than in the hospital. Home care services are continuous and comprehensive services provided to individuals and families to minimize the effects of disease [12]. The order process for this service can be done online by filling out the order form and can be accessed online via computers, laptops, and smartphones. This can break the Covid-19 infection because the working concept of this service is to assign the closest health officer to serve patients directly in their homes. Thus, this does not create a new Covid-19 cluster.

2. Method

2.1 Data Collection
The data were collected through observation, interviews, and literature review. The time required for the data collection process was 3 months, from January to March. Data collection was carried out long before Covid-19 hits Indonesia. The data was collected by coordinating with medical and paramedics at a hospital that provides a Home Care program, namely the Kerta Usada Hospital in Singaraja, Bali-Indonesia. The interview was carried out with 10 people which are doctors, nurses, and patients. Based on the results of interviews, 8 out of 10 respondents wanted the application to be developed because of its convenience, and 2 respondents stated that they did not understand this application. However, it was not enough because the data obtained was limited. The literature review provides business processes of the applications as well as the need of the user in developing this application, such as the use case in Figure 2.

2.2 Application Development
The development of the health service application used Agile Methodology or known as the short-term development methodology. The reason for choosing the Agile method was because the development process required rapid adaptation to any form of changes, less time was invested in documentation and analysis because the clients were continually viewed, tested the product, and also provided feedback. This became a needed process in the development of the Home Care application because it required fast feedback and must immediately revised according to users need. Agile modeling is also a set of values, principles, and practices for modeling software so that it can be used in software development projects effectively and efficiently. The process in Agile can be seen in Figure 1.

![Figure 1. Agile Methodology [13].](image-url)
Figure 2. Use case of application home care.

- Planning Stage
  The planning stage is the earliest stage or the first stage of the agile model in the process of developing a mobile-based health service application. At this stage, data is collected to be used in the development of the application therefore the next stage would be easier after all the data had been collected. After all data is collected, the activity is continued to the analysis stage.

- Analysis Stage
  The analysis stage answers questions about potential users of the online-based health service application, the services that the application can provide, also the time and place the application can be used; as shown in Figure 2. This stage is used to make improvements and developed concepts for online-based health service applications if it is necessary. Likewise, it should be remembered that the results of the analysis phase are the analysis along with the initial design for the system, namely in the form of a use case diagram.

- Design (modeling) Stage
  The modeling phase is done by creating the interface design based on the pre-designed model. UML is a modeling method that replaces the object-oriented analysis method and object-oriented design (object-oriented analysis and design). UML serves to model all object-oriented systems. Modeling languages can also be used by humans or machines to make it easier for developers in discussing system design with a comprehensible modeling language. Based on the type of diagram, UML can be divided into several parts, namely, use cases, activity diagrams, sequence diagrams, and class diagrams. In addition, the designs prepared are database design and system interface design.
• Implementation Stage
  This stage aims to implement the design that has been made. The coding process is carried out on the website and mobile thus the application can be accessed online and via a smartphone. This process took 6 months to develop an application and then a testing process is carried out to find errors.

• Testing and Integration Stage
  Online-based healthcare applications are tested based on the initial design to ensure their performance. If the system does not match the initial design, the process will return to the first stage. Checks are done repeatedly to make sure there are no bugs as well as shortcomings and things that were not needed. The methods used to test the mobile-based Home Care health service application were White box and Black box. After completing the White box and Black box testing, it is continued by conducting Usability Testing using the System Usability Scale (SUS) questionnaire on a scale of 1-5 and the results were 65,125 from 20 respondents who are medical personnel, paramedics, and patients. This value is “Good” category. The activities carried out by the assessor in the White box test are as follows:
  1. Test the functions of the application.
  2. Test the suitability of workflow functions in the application with the requirements (requests) needed by the customer.
  3. Look for bugs or errors from the application interface (display)
  4. Integration of website-based service systems with mobile applications so that the data transferred can be synchronized.

• Maintenance Stage
  This is the stage of operating and maintaining the system. This stage is the software development life cycle that requires the longest time because maintenance includes correcting various errors that are not found in the previous stages, making improvements to the implementation of the system unit, and the development of system services as well as adding features and maintaining good data consistency both in the side of server or client.

2.3 Framework Code Igniter and Visual Studio Code
  The framework according to [14] is software that has the aim of making it easier for mobile, web, or similar application developers to build an application. Each framework has basic command functions for developing applications that make it easier for developers to build applications faster with structured code. There are several frameworks used as follows.
  Code Igniter is a framework used to build dynamic PHP applications. Code Igniter is a PHP framework with an MVC model (Model, View, and Controller) which is used in building dynamic websites using PHP which can speed up programmers to create a web. Besides being lightweight and fast, Code Igniter also has complete documentation and is supplied with examples of code implementation. This complete documentation makes Code igniter the framework of choice. In the case of this health care application, code igniter is used as a framework to create a design and build of a Web-based Home Care Service application.
  Visual studio code (VS Code) is a lightweight and reliable text editor made by Microsoft for multiplatform operating systems, which means it is also available for Linux, Mac, and Windows versions. This text editor supports JavaScript, Typescript, and other programming languages with the help of a plug-in that can be installed via Visual Studio Code marketplace.

2.4 Android Studio
  Android Studio is an Integrated Development Environment (IDE) that is modified or developed in such a way as to become a complex floating environment for creating Android operating system applications based on Intellij IDEA [15]. The features of the Android studio are as follows:
  1. The base system uses Gradle, which is updated regularly and flexible
  2. A complete feature on the default emulator
3. When testing the application, it is not necessary to build the application into the APK because there is an Instant Run feature that automatically builds the application to the connected device.

4. There is an ADB Wi-Fi feature that enables the smart phone to act as an emulator without using a data cable.

5. Push, pull feature, which eases developers to import and export code to GitHub, Git and others.

3. Result and Discussion
The development of the Application was carried out and implemented properly according to the initial design. The application ran on two sides (1) server-side and (2) client-side. On the server-side, a website managed by an administrator was installed as shown in Figure 5. Admin could log in as shown in Figure 3 to perform several processes such as managing patient data, staff data, service data, transaction data, and customer satisfaction data. On the user-side (client-side), the application can be accessed via an Android smartphone by installing the Home Care application. After installing the application, users could register by using email, and an activation code is sent via email. Then, if the
user wants to order services, they have to fill in the form provided as shown in Figure 4, and then they can order services. The closest staff will receive notification from the customer, if the notification is approved by the staff, the Home Care process can be carried out. If there is any additional fee, the medical staff will confirm it to the family of the patient. Payment can be made via ATM transfer and recipe of transfer can be uploaded to the system by the patient. The system testing process was carried out as shown in Table 1.

Table 1. Testing Application.

| No | Test               | Admin on Website | User on Android | Description                                                                                                                                                                                                 | Result       |
|----|--------------------|------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1  | registration       | √                | √               | Enter your e-mail, full name, user name and password correctly. If the registration process is successful, an activation email will be sent.  
User enters the account username or e-mail and password. If successful, the user will be directed to the home screen.  
The patient fills in the data according to the form. If successful, the user will be redirected back to the patient list page. Admin only checks the data that has been filled in by the patient.  
User can add services to the cart. The first way, the user can use the dialog. Set the amount using the plus and minus keys or enter manually with the keyboard. The second way, through the service details, set the amount using the plus and less buttons or enter manually with the keyboard.  
The user enters a description of the rating and determined the star rating of the service. If successful, the user will be redirected back to the history list page.  
User can cancel the order by deleting the service in the cart  
User can update password to login  
The staff can view a list of service requests by the user  
The user can manage their personal profile  
The staff can see a list of service requests by the user  
The cost of treatment is standardized, if there are any additional services and medicines, it can be added by the officer. Maintenance costs include travel costs, which are managed by the admin.  
Staff can see a history of the services that have been performed. The information displayed includes an assessment rating, address implemented services, total costs, patient name and other info related to patient satisfaction | running well |
| 2  | login              | √                | √               | Running well                                                                                                                                                                                                | running well |
| 3  | patient data       |                  |                 | running well                                                                                                                                                                                                | running well |
|    | management         |                  |                 | running well                                                                                                                                                                                                | running well |
| 4  | service requests   | √                |                 | running well                                                                                                                                                                                                | running well |
| 5  | assessment services|                  |                 | running well                                                                                                                                                                                                | running well |
| 6  | cancel request     |                  |                 | running well                                                                                                                                                                                                | running well |
| 7  | password renewal   | √                | √               | running well                                                                                                                                                                                                | running well |
| 8  | accept service     |                  |                 | running well                                                                                                                                                                                                | running well |
|    | requests           |                  |                 | running well                                                                                                                                                                                                | running well |
| 9  | profile management |                  |                 | running well                                                                                                                                                                                                | running well |
| 10 | service list       |                  |                 | running well                                                                                                                                                                                                | running well |
|    | management         |                  |                 | running well                                                                                                                                                                                                | running well |
| 11 | cost management    |                  |                 | running well                                                                                                                                                                                                | running well |
| 12 | see user           |                  |                 | running well                                                                                                                                                                                                | running well |
|    | satisfaction       |                  |                 | running well                                                                                                                                                                                                | running well |
|    | ratings            |                  |                 | running well                                                                                                                                                                                                | running well |
4. Conclusion
The Home Care application was successfully developed by applying the Agile method stages. The development process was carried out in a short time (about 6 months), amid many revisions both physically and structurally. This study aims to facilitate public access to health services without having to visit a hospital or clinic. With the existing limitations, both data and literature, finally the application was successfully developed. With this application, everything can be done from home, ordering services, and taking care of the patient can be done at home (Home Care). Everyone has the right to enjoy comfort in health services, especially in the midst of a pandemic that hits all countries around the world. This is relatively safe to minimize coronavirus transmission because people do not need to visit the hospital. The results of testing the system using the application method and Beta Testing with the White Box and Black box methods went well. The Usability testing process with SUS was in “Good” category, namely a value of 65,125.

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