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Design of an Android-Based Motorcycle Service Booking Application

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Abstract: A motorbike is a two-wheeled vehicle powered by an engine. Motorbike users are required to service their cars because the components on the motorbike will experience a decrease in performance along with the length of time they use the motorbike. However, this can be overcome by servicing your motorbike regularly. However, sometimes motorbike users have to face queues at workshops that are long and quite time-consuming. Then, an Android-based online motorbike service booking system was created, which did not require customers to come to the seminar directly to make a booking. With this application, customers must book via Android by selecting the desired schedule. The application was created using Android Studio with the Kotlin programming language. The database section uses the Firebase Real-time Database to update the data in real-time. The service provider will also easily confirm orders via the website connected to Firebase. In short, it is hoped that this application can help motorbike users book services online so they don't have to spend time queuing.

Keywords: Android Studio; Queue; Firebase; Motorcycle; Service.

1. Introduction

Transportation can facilitate the movement of people or goods from one place to another [1]. One of the many modes of transportation that is often used is motorbikes. The view of motorbikes in Indonesia has been around for a while. From morning until night, the two-wheeled vehicles continue to adorn the streets. Based on data from the Central Statistics Agency (BPS), as of February 2024, the number of motorbikes in Indonesia will reach 148 million units [2]. The relatively low price makes motorbikes the people's choice as the primary form of transportation, whether for going to work, school, or just for a walk [3]. Motorbikes should be serviced regularly to avoid higher maintenance costs. Over time, motorbike components will experience damage or decrease in performance, especially if regular maintenance is neglected. Common problems motorbike users encounter include flat tires, engine malfunctions, and non-functional lights, all of which can disrupt a trip. Motorbike servicing is typically done at a repair shop, requiring users to wait in a service line, which consumes considerable time and reduces convenience.

In this modern era, smartphones have become a necessity. As the name implies, a smartphone is a smart device that offers functionalities and capabilities comparable to computers, including RAM, processors, and more [4]. Smartphones also have advanced features such as cameras, GPS, and WiFi. Using smartphones, users can order services without waiting in line or calling a mechanic to their home, thus avoiding the hassle of going to a repair shop. Motorbike servicing is essential for the vehicle's longevity and its users' safety. Regular maintenance helps identify potential issues before they become serious problems, ensuring that the motorbike remains in good working condition. However, the traditional method of servicing, which involves physically going to a repair shop and waiting in long queues, could be more efficient and efficient. This is where technology can play a crucial role in improving the service experience for motorbike users.

The rapid advancement of technology, particularly in mobile applications, allows one to address the inefficiencies in the traditional motorbike servicing system. With the proliferation of smartphones and the increasing internet penetration, developing an Android-based motorbike service booking application can significantly enhance user convenience. Such an application allows users to book servicing appointments from their smartphones, eliminating the need to visit the repair shop and wait in line physically. The development of an Android-based motorbike service booking application involves several vital components. Firstly, the application needs a user-friendly interface that allows users to easily navigate through different functionalities, such as booking a service, checking the status of their booking, and receiving notifications about their service. The application should also provide options for users to select the type of service they need, the preferred date and time, and any specific requests or complaints they may have regarding their motorbike. One of the critical aspects of developing such an application is the choice of technology stack. Android Studio is used for front-end development, with Kotlin as the programming language. Kotlin is preferred due to its concise syntax, safety features, and seamless integration with existing Java code. For the back end, the Firebase Real-time Database is utilized to store and manage booking data. Firebase provides real-time data synchronization, ensuring that users and service providers have up-to-date information about the booking status.

Using Firebase Real-time Database also allows for efficient management of service bookings. Service providers can access the booking data through a web interface built using PHP and Apache Server to confirm or reject service requests. This integration ensures that the entire booking process, from the user's request to the service provider's confirmation, is streamlined and efficient. The application also incorporates various security features to protect user data. This includes secure authentication mechanisms, data encryption, and regular security audits to identify and address potential vulnerabilities. Ensuring the privacy and security of user data is paramount, especially given the sensitive nature of personal information involved in service bookings. In addition to enhancing user convenience, the application aims to improve the overall efficiency of motorbike servicing. By allowing users to book services online, repair shops can better manage their schedules and resources, reducing wait times and improving customer satisfaction. The application also provides valuable insights into user preferences and service trends, enabling providers to tailor their offerings and improve their services. Adopting such a technological solution aligns with various industries' broader digital transformation trends. As more aspects of daily life become digitized, consumers increasingly expect seamless and convenient service experiences. The development of an Android-based motorbike service booking application represents a step towards meeting these expectations and leveraging technology to enhance service delivery in the automotive sector.

2. Research Method

The research framework is the main point of research thinking that can help determine theories, concepts, and variables when conducting research. The current motorbike service system in workshops still uses a queuing system that requires customers to come directly to the seminar and queue for their turn to be serviced. This system is felt to be less effective because it requires customers to come to the repair shop and wait for their motorbike's turn to be serviced, which will save customers time, resulting in a decrease in satisfaction scores. Therefore, a proposal was made to book motorbike services via an Android smartphone. The first step is to design the application and implement a motorbike service booking system. In the final stage, it is hoped that the motorbike service booking application will have a user-friendly interface that can help customers make orders anywhere and anytime and can run systematically so that it can provide benefits for users.
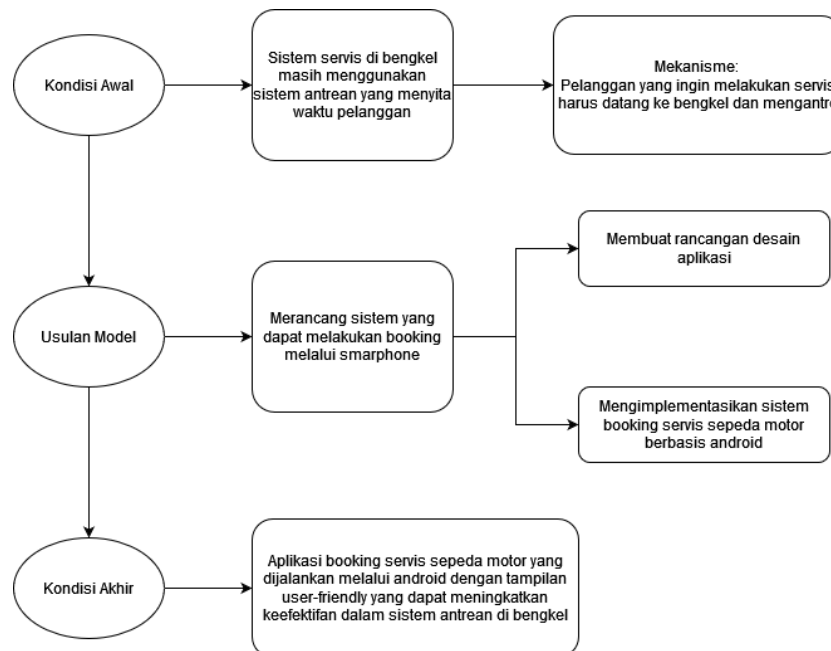

Figure 1. Research Framework

System architecture is vital to the sustainability of the application and is used as a benchmark in the development process [5]. Customers use smartphones to make bookings, while service providers use PCs or laptops to confirm bookings that have been ordered or received by utilizing Firebase to facilitate application development. Not only that, the Firebase real-time database can also synchronize data in real-time so that customers can monitor the status of bookings that have been ordered directly.
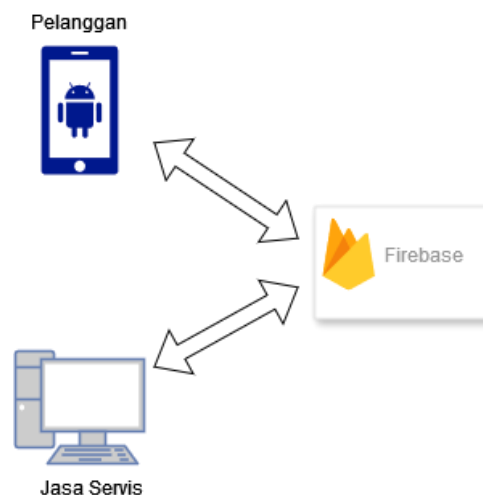

Figure 2. System Architecture

During this research, the use of a variety of hardware and software became a necessity. The Windows 11 operating system is used on the software side, while Android, a Linux-based operating system, is chosen for smartphone and PDA applications [6]. The Android application development process is carried out through the Android Studio platform using the Kotlin programming language [7]. Kotlin chose it for various reasons, including the ease of developing Android applications and the ability to reduce errors and bugs in the code while also providing better security and more concise code than Java. Firebase stores data in JavaScript Object Notation (JSON) format, enabling fast data addition, deletion, and change operations. Meanwhile, on the website, using PHP and Apache Server from XAMPP allows the display of booking data that customers have ordered so that the service provider can directly confirm it [8][9]. The hardware consists of an Asus VivoBook K413EQ laptop with Intel Core i5-1135G7 specifications, 8 GB RAM, 512 GB SSD, and an Nvidia GeForce MX-350 graphics card. Meanwhile, for the Android smartphone, the Xiaomi Redmi Note 9 is used with Android operating system specifications, Mediatek Helio G85 processor, and 4/64 GB memory.

3. Result and Discussion

3.1 Results

This research results in developing an application that allows users to make orders online via an Android device while the service can confirm customer orders. This application consists of several main pages. First is the login page, where users can log in using the previously created account to start the service booking process. This login display can be seen in Figure 3. Next, the Register Page allows customers to create a new account by entering information such as name, email address, and password. It is essential to ensure that the email used is active because the application will send a verification email to activate the account before the user can enter the application. After successfully logging in, users will be directed to the Main Menu, which displays details of the bookings they have previously booked. This page provides easy access to view and manage bookings that users have made.
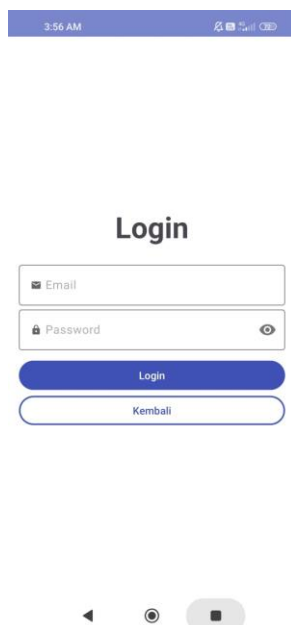

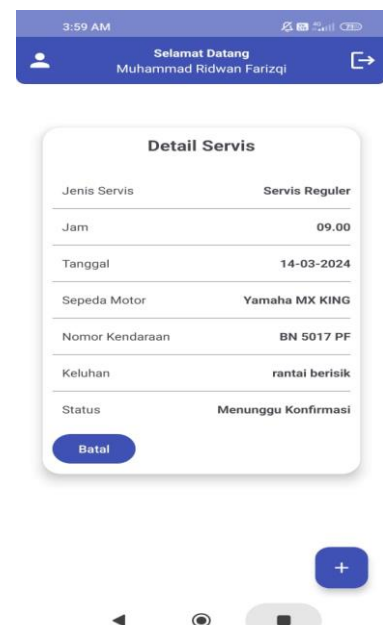Figure 3. Login Display   Figure 4. Menu display   Figure 5. Service Details

Users can add bookings according to their preferences, including the type of service desired and the date and time of service. In addition, customers must choose the brand or type of motorbike to be serviced and include the vehicle registration number. If customers experience complaints about their motorbikes, they can fill out the complaint form provided. This page is also equipped with Figure 6, which shows the process of adding a booking. Next, the User Profile page displays information about the user, such as name, email address, and profile photo. Users can change their name and profile photo as desired, as seen in Figure 8, Edit Profile. This gives users the flexibility to personalize their profile as they wish. Figure 7 also shows the appearance of the profile page.

Figure 6. Add Booking

Figure 7. Profile View

Figure 8. Edit Profile

In the admin section or the service, the party uses a web, which is run using an Apache server to confirm bookings that customers have ordered.

Figure 9. Incoming Booking Data

Figure 10. Received Booking Data

Figure 11. Completed Service Data

Then, black box testing is carried out to test the functionality of the application based on input and output [10]. The following are the results of the test which can be seen in table 1.

Table 1. Application Testing

No	Feature	Expected results	Results That Happened	Status
1	Register and Login account	Create an account and send a verification email to activate the account used to log in	The account is stored in firebase and the app sends a verification email to the email address entered by the user	Succeed
2	Make a Service Booking	Customers can make service bookings according to their wishes	Bookings that have been ordered are recorded in Firebase	Succeed
3	Displays Service Details	View details of the service booking that has been ordered	Customers can see service details on the menu page	Succeed
4	Viewing Profiles And Changing Profiles	Displaying profiles that match the data in firebase and editing customers can change the profile	Berhasil menampilkan profil serta megubah nama dan foto profil	Succeed
5	Confirming the Booking	Can confirm bookings that have been ordered	Admin can accept or reject service bookings that have been ordered by customers	Succeed

3.2   Discussion

The advent of technology has significantly transformed various aspects of our lives, including how we access services. The motorbike service industry is no exception. Traditional methods of motorbike servicing, which involve physically visiting a repair shop and waiting in line, are increasingly being replaced by more efficient and user-friendly digital solutions. This section discusses the development and implications of an Android-based motorbike service booking application, focusing on its design, functionality, and potential impact on users and service providers. One of the primary motivations for developing an Android-based motorbike service booking application is to address the inefficiencies associated with traditional servicing methods. As discussed earlier, the conventional process of motorbike servicing is time-consuming and often inconvenient for users. The proposed application aims to streamline the booking process by leveraging mobile technology, thereby enhancing user convenience. The ability to book a service through a smartphone saves time and provides users with greater flexibility in scheduling their appointments. The design and functionality of the application are crucial to its success. The application must offer a user-friendly interface that is easy to navigate. This involves designing intuitive menus and clear instructions to guide users through booking. Features such as service selection, date and time preferences, and specific requests or complaints must be easily accessible.

Moreover, the application should provide real-time updates on booking status, ensuring that users are informed about their appointments. The choice of technology stack for developing the application is also significant. With Kotlin as the programming language, Android Studio is selected for front-end development due to its robustness and compatibility with existing Java code. Kotlin's concise syntax and safety features make it ideal for developing a reliable and efficient mobile application. The Firebase Real-time Database is utilized on the back end to manage booking data.

Firebase offers real-time data synchronization, ensuring that users and service providers have up-to-date booking information. Integrating Firebase Real-time Database with the application enhances its functionality. Service providers can access booking data through a web interface built using PHP and Apache Server. This integration allows service providers to efficiently confirm or reject service requests, streamlining the booking process. By reducing manual interventions and automating data management, the application improves the overall efficiency of motorbike servicing. Security is a critical aspect of the application. Given the sensitive nature of personal information in service bookings, the application incorporates various security features to protect user data. Secure authentication mechanisms, data encryption, and regular security audits are implemented to ensure the privacy and security of user data. These measures are essential to build user trust and encourage application adoption. The potential impact of the application extends beyond user convenience. The application offers valuable insights into user preferences and service trends for service providers. By analyzing booking data, service providers can identify peak times for service requests, common issues users face, and popular services. This information enables service providers to optimize their operations,

manage resources more effectively, and tailor their offerings to meet user needs. As a result, the application can improve the overall quality of motorbike servicing.

Furthermore, the application aligns with various industries' broader digital transformation trends. As consumers increasingly expect seamless and convenient service experiences, digital solutions like the proposed application are becoming essential. Adopting such technology in the motorbike service industry enhances service delivery and positions service providers to stay competitive in a rapidly evolving market. Developing an Android-based motorbike service booking application addresses the inefficiencies of traditional servicing methods and offers users a convenient, efficient solution. By leveraging advanced mobile and web technologies, the application streamlines the booking process, enhances user experience, and improves the overall efficiency of motorbike servicing. The application also provides valuable insights for service providers, enabling them to optimize their operations and enhance the quality of service. This discussion highlights the potential of technology to transform service delivery in the motorbike service industry and underscores the importance of continued innovation in this field.

4. Related Work

Numerous references for designing a motorbike service booking application are available. These studies employ various methodologies, technologies, and features that contribute to developing efficient and user-friendly service applications. Research conducted by Muhamad Iqbal, Mesterjon Mesterjon, and Yode Arliando (2021) focused on creating a booking service application for Jhon Motor using the SDLC (Software Development Life Cycle) methodology. The programming language for the Android application was Java, while the web application was developed using PHP. In this system, customers can make bookings via smartphones, and the admin can confirm the bookings through the web application. This research highlights the importance of integrating mobile and web platforms to enhance user experience and streamline booking processes [11]. Another significant study by Nelly Sofi and Riza Dharmawan (2022) involved developing an online reservation application for CSM workshops using Flutter as the development framework. This application allowed customers to choose various services, including repainting and tuning motorbikes. Flutter enabled the creation of a cross-platform application, ensuring a consistent user experience across different devices. This research emphasizes the versatility of modern development frameworks in creating comprehensive service applications [12].

Hidayatur Rohman (2023) designed a car service booking application implementing the First In First Out (FIFO) algorithm. The web-based application was built using MySQL as the database. Information from the queue was displayed based on FIFO scheduling, which was tested using black box testing to ensure functionality and reliability. This research underscores the significance of efficient queue management algorithms in service booking applications to improve customer satisfaction [13]. Dwi Rahmawati, Sharyanto, and Bernadus Gunawan Sudarsono (2023) developed a web application using PHP and MySQL to facilitate online booking registration and check spare parts availability. This application aimed to streamline the booking process and provide real-time information about spare parts inventory. The research demonstrates the benefits of integrating inventory management with booking systems to enhance service efficiency and customer convenience [14].

Further research by Alter Junior Fernando Pangalila and Maulana Ardhiansyah (2022) involved designing a service booking management application system for the Rido Racing Rempoa motorbike repair shop. The application was created to increase customer efficiency by providing information about the workshop, enabling service bookings for motorbikes, and displaying prices for spare parts. The programming language used was PHP, and MySQL was used for data storage. This research highlights the importance of comprehensive service information and user-friendly interfaces in improving customer experience [15].

These studies collectively contribute to understanding how digital solutions can revolutionize traditional service industries. These applications aim to enhance user convenience, streamline booking processes, and improve overall service efficiency by leveraging various technologies and methodologies. Integrating mobile and web platforms, efficient queue management algorithms, and real-time inventory information are vital features that significantly enhance service booking applications' functionality and user experience. The existing body of research provides a solid foundation for developing a motorbike service booking application. By incorporating the successful elements of previous studies, such as modern development frameworks, efficient queue management, and comprehensive service information, it is possible to create a robust and user-friendly application that meets the needs of both customers and service providers. This discussion of related work

underscores the importance of continuous innovation and adaptation of new technologies to enhance service delivery in the motorbike industry.

5. Conclusion

This research succeeded in designing an Android application that allows customers to book services online easily. Customers can make bookings according to the date, time, and type of service they want. Several additional features have been added to improve the quality of the application, including a booking system using quotas on specific dates and times, eliminating the need for manual admin confirmation, a feature to display the history of services that have been carried out, as well as service status notifications sent directly to the customer's smartphone, enabling them to update service developments more quickly and easily, increasing transparency and customer engagement. With exemplary implementation, this application is expected to provide better solutions and experiences in ordering and managing motorbike services. Thus, the application can significantly increase service efficiency, customer satisfaction, and accessibility to motorbike servicing services. Understanding user needs and paying attention to user data's security and privacy aspects is also the focus of developing this application.

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