

A Mobile-Based Used Vehicle Buying System Implementation

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Abstract: Aspect-oriented software is characterized by enhanced reusability and maintainability compared to object-oriented software. In aspect-oriented software development, concerns scattered across objects are separated and modularized into aspects. This research is motivated by the buyer's mistrust in used vehicle transactions due to concerns over potential fraud. To address this, the study proposes designing an e-commerce application that facilitates interactions between prospective vehicle sellers and buyers, alleviating transactional apprehensions. The analysis and design phases of the software development cycle employ Use Cases to facilitate the identification and separation of concerns. Use Cases are chosen for their direct illustration of user-system interactions. The case study focuses on a mobile e-commerce application for used vehicle sellers and buyers. The research aims to analyze the impact of consumer motivation, perceived quality, and consumer attitudes on the decision to purchase used vehicles. The findings are expected to aid sellers in marketing their vehicles and assist buyers in making informed purchasing decisions.

Keywords: Aspect-Oriented Software Development; Purchase Decision; Use Case; E-Commerce; Consumer Motivation.

1. Introduction

The current era's rapid advancement in information technology has significantly penetrated various sectors, enhancing service delivery intricately linked with technological advancements [1]. This is especially evident in commercial activities, such as the buying and selling of vehicles, where the use of information technology mediates and simplifies transactions [2]. Observing the fundamental nature of vehicle trade in societal activities and the need for technological mediation, this research was initiated. It aims to develop a project that facilitates safe and comfortable vehicle trade, addressing the current challenges faced by the public in such transactions [3]. Preliminary research indicates that trading activities are prevalent across diverse platforms, with online marketplaces, such as Facebook, being popular for second-hand goods transactions. However, these platforms often lack adequate filters or verification mechanisms, leading to exploitation by fraudulent entities. This situation highlights the need for a reliable trading platform, specifically for vehicles, to counteract these fraudulent activities.

Considering Indonesia's rapid technological development, there is a significant opportunity to create a platform that not only simplifies the process of trading used vehicles but also ensures security and trustworthiness. This project proposes to create such a platform, aiming to provide a seamless and secure environment for both sellers and buyers, thus minimizing fraudulent activities commonly associated with online vehicle trade. By leveraging technology, this initiative seeks to revolutionize the traditional methods of vehicle trading, aligning with global trends in e-commerce and online business. The development of this platform is informed by existing studies on the impact of e-commerce in business environments, particularly focusing on the trust and security aspects that are crucial for customer engagement and satisfaction. Moreover, the broader implications of e-commerce on international trade and employment, as well as its adoption by small and medium-sized enterprises in developing countries like Malaysia, provide a contextual background for this study.

2. Research Method

In the design phase of the Online Vehicle Trading System Implementation study, several research methods were employed to gather necessary data and information. The first stage involved direct observation of used vehicle sellers by visiting used vehicle dealerships and showrooms. This approach enabled the collection of objective data from business operators in the used vehicle market, crucial for designing the proposed online vehicle trading system. The second stage consisted of interviews with business operators in this sector. Dialogues were conducted with owners of used vehicle dealerships and other stakeholders in the used vehicle trade. The purpose of these interviews was to obtain detailed and in-depth data about the processes involved in used vehicle transactions. Moreover, this data collection process aimed to identify solutions for transitioning from traditional trading methods, which are often fraught with high risks of fraud, to a more secure and efficient online system.

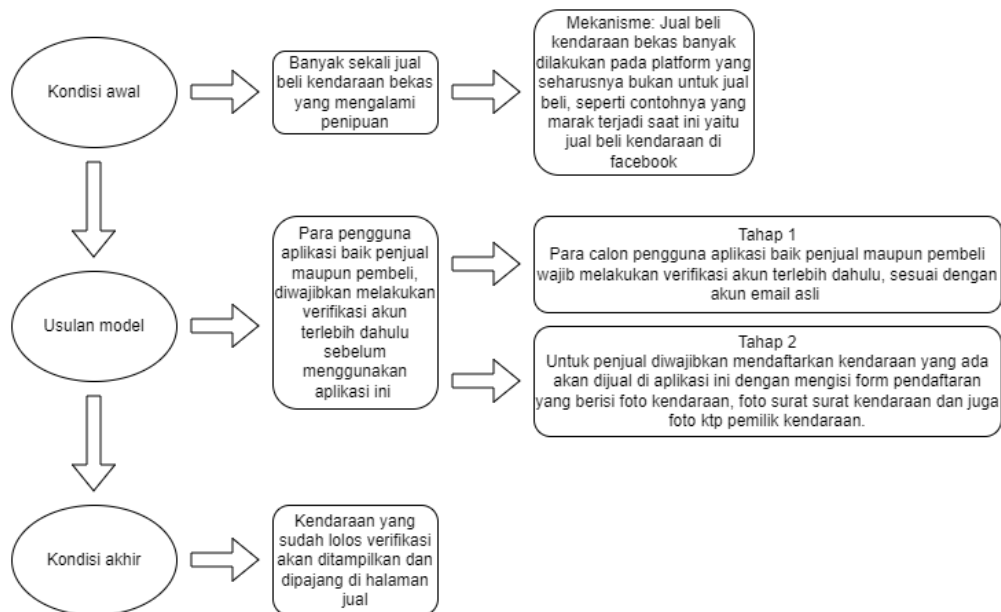


Figure 1. Implementation of a Mobile-Based Used Vehicle Buying and Selling System

The envisioned system is designed to enhance the safety and comfort of both sellers and buyers in the vehicle trading process. It includes a verification process for all users, ensuring that the data of both sellers and buyers are securely stored in the system's database. This verification process is expected to significantly reduce the incidence of fraudulent activities in transaction processes, as every potential seller and buyer must undergo a thorough verification before engaging in any transactions.

3. Result and Discussion

3.1 Results

The outcome of this research is the design of an Online Used Vehicle Trading Application, represented through data flow diagrams and flowcharts. These diagrams and procedures are utilized to identify the buying and selling processes within the system, which features login, homepage, profile page, product page, purchase and payment page, and transaction history page. The login menu serves as the gateway for account registration and application access using an email and password. The homepage displays all accessible features of the application. The profile page contains the user's current account information, including profile photo, name, and registered email stored in the database. The product page showcases all previously verified vehicles available for advertisement. The purchase and payment page is integrated with the Payment Gateway service used in this application, namely Midtrans. The Transaction History page presents a summary of past purchases.

3.1.1 Program Implementation

Figure 2.a shows the login page, where users must first register an account to access the application. Successful login leads to the homepage, as depicted in Figure 2.b, which is the access point to all application features. Figure 2.c displays the profile page, containing the user's profile photo, name, and email address. Figure 2.d illustrates the product page, listing the vehicles for sale within the application. Users can scroll through to find available vehicles. Figure 2.e and 2.f

represent the purchase and payment pages, respectively, showing the integration with the application's Payment Gateway partner, Midtrans.

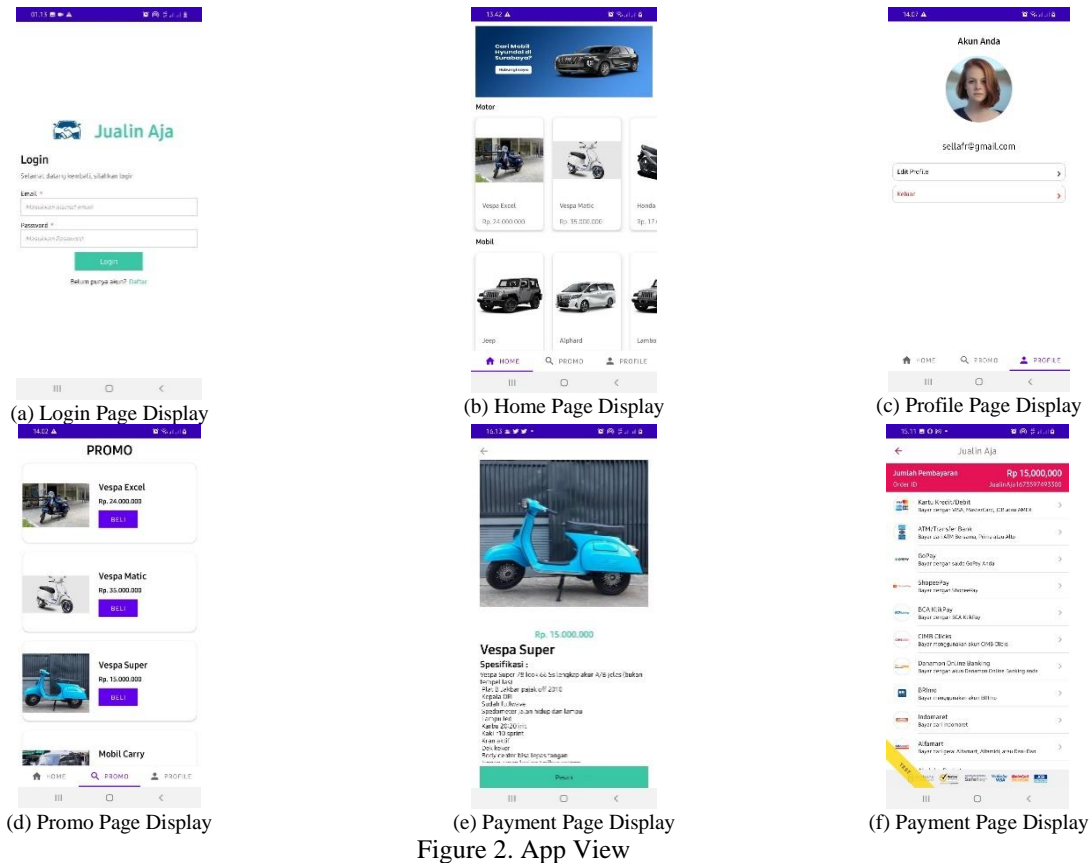


Figure 2. App View

3.1.2 Testing

In the testing phase of the Mobile-Based Used Vehicle Trading Application, I, as the researcher, conducted various application tests on different smartphone devices with varying brands, operating systems, and specifications. The results are summarized in the following tables:

Table 1. Menu Testing

Input Data	Which are expected	Observation	Conclusion
Registration Page	Entering data into the database	Receive Data	Accepted
Profile Page	Displays email data when logging in	Receive Data	Accepted
Payment Page	Perform payment transactions	Payment Successful	Accepted

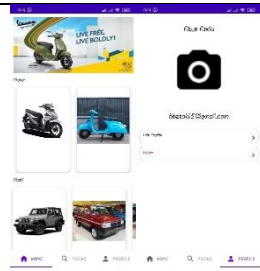
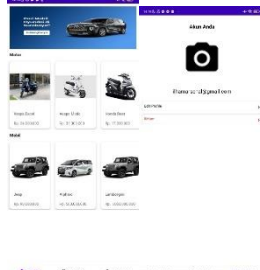
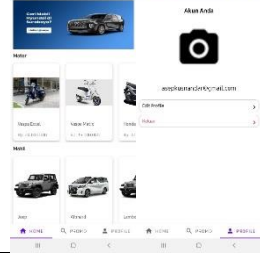
Table 2. Information Testing

Input Data	Which are expected	Observation	Conclusion
Home Page	Displays Slider, Motorcycle and Car data	Display data	Accepted
Promo Page	Displays motorbike and car promo data	Display data	Accepted
Vehicle Details Page	Displays detailed vehicle data	Display data	Accepted

Table 3. Profile Page Testing

Input Data	Which are expected	Observation	Conclusion
Profile Page	Edit profile data	Display data	Rejected

Table 4. Testing on Android Devices

Mobile Name	Specification	Results
Redmi Note 3	<ul style="list-style-type: none"> - 4GB Ram - Internal 64GB - Mediatech processor - Android OS 10 	
Redmi Note 8	<ul style="list-style-type: none"> - 4GB Ram - Internal 64GB - Snapdragon processor - Android OS 11 	
Samsung Galaxy A10s	<ul style="list-style-type: none"> - 2GB RAM - Internal 32GB - Mediatek processor - Android OS 11 	

After testing on various smartphone devices with different brands, operating systems, and specifications, it is evident that the Mobile-Based Used Vehicle Trading System Application is compatible with various smartphone brands and Android operating systems ranging from Android 9 to 11, as well as with varying specifications.

3.2 Discussion

The development and subsequent testing of the Online Used Vehicle Trading Application reveal several key insights. First, the integration of a comprehensive data flow design, as evidenced by the implementation of various user-centric pages (login, homepage, profile, product, purchase and payment, and transaction history), demonstrates the application's potential in streamlining the used vehicle trading process. This approach aligns with current trends in e-commerce, where user experience is paramount [1][2]. However, the application's reliance on user verification through email and password, while a standard practice, may not be sufficient to completely mitigate the risks of fraudulent activities. Further security measures, such as multi-factor authentication or integration with national identity databases, could be considered to enhance trust and safety [3][4]. The successful operation of the application across various smartphone models and operating systems indicates its broad accessibility, a crucial factor in reaching a diverse user base. This is consistent with findings that suggest the importance of cross-platform compatibility in mobile applications to ensure wider adoption [5][6]. The research, however, encountered limitations in the scope of testing, particularly in evaluating the application's performance under different network conditions and its usability among non-tech-savvy users. Future studies could address these aspects to ensure the application's robustness and user-friendliness across a broader demographic [7][8]. Moreover, the integration with the Midtrans Payment Gateway is a strategic choice, considering its popularity and reliability. However, dependence on a single payment service provider could limit the application's flexibility. Exploring additional payment options could cater to a wider range of user preferences, reflecting trends in digital financial services [9][10].

4. Related Work

The scholarly discourse on E-commerce presents a nuanced understanding of its multifaceted impact across various domains. Mujiyana (2013) expounds upon E-commerce's scope, which transcends mere online transactions to encompass a holistic process involving development, marketing, sales, delivery, service, and payment. This comprehensive process is facilitated through a global network of business partners, leveraging extensive internet resources and advanced

information technologies [1]. Kodong *et al.* (2012) explore the facilitative role of E-commerce in streamlining trading processes. They emphasize how E-commerce enables sellers to effectively promote their products and consumers to conveniently locate necessary items. The study further elucidates the role of e-marketplaces in expediting these transactions by providing a converging point for buyers and sellers to interact and exchange information seamlessly [2]. In their investigation, Mansur and Bengkalis (2015) delve into the Business to Business (B2B) e-marketplace, particularly its utility as a promotional tool for Small and Medium Enterprises (SMEs). Their research underscores the significance of marketplace transactions in enhancing SME competitiveness, aided by the strategic application of Information and Communication Technologies. The study reveals the operational efficiency of a B2B e-marketplace, comprising website managers, SMEs, and suppliers, in managing data and facilitating the interchange of product catalogues and raw material information [3]. Rahmadiani (2015) offers a multidimensional definition of E-commerce, considering it as a communication medium, a catalyst for business process automation, a service quality enhancer, and a platform for online trading of products and information. This perspective positions E-commerce as a key facilitator in the continuum of business activities, bolstered by a robust global business network [4].

Alwendi (2020) classifies E-commerce into two primary categories based on their intrinsic characteristics: Business to Business (B2B) and Business to Consumer (B2C). B2B is distinguished by regular data exchanges and a peer-to-peer model, whereas B2C is characterized by on-demand services and typically operates on a client-server model [5]. Hanafi *et al.* (2019) address operational challenges in the used motor vehicle sector, like intense competition and the ambiguity of product availability. They developed a mobile application using the waterfall methodology, which demonstrated high usability and user satisfaction, indicating its potential in addressing these market-specific issues [6]. Arief Herdiansah (2020) transitions the focus to digital transformations in motorbike sales within small and medium dealerships. The application of the Pieces methodology in their information system significantly enhanced the efficiency of the sales process and improved the accessibility of information for potential customers [7].

Suhariono and Konsake (2019) investigated the development of an online Customer to Customer (C2C) sales web portal. Their findings suggest that such a portal not only expands marketing avenues for sellers but also facilitates easier access to information for consumers, thus enhancing the overall efficiency of online marketplaces [8]. Aisyah and Achiria (2019) reflect on the influence of digital advancements on human behavior, particularly in accessing information and electronic services. They highlight that E-commerce involves a broad spectrum of activities, including the distribution, purchase, sale, and marketing of goods and services through electronic systems like the internet [9]. Darmawansyah and Aguspriyani (2019) delve into the influence of information technology, including financial technology (fintech), on economic dynamics. They discuss how fintech introduces innovative business models, applications, and processes in the financial services sector [10].

Vernia (2017) underscores the pivotal role of social media in linking sellers and buyers. The study posits that social media is instrumental in attracting consumers and building brand image, thus playing a crucial role in E-commerce [11]. Angga Kurnia *et al.* (2017) conceptualize the Marketplace as an internet-based platform that facilitates business transactions. This platform enables buyers to explore multiple suppliers, thereby obtaining products at competitive market prices [12]. Nuray (2011) highlights that E-commerce presents opportunities for both developed and developing countries, with a more pronounced long-term benefit for developing nations like Indonesia [13]. Ahmad *et al.* (2015) offer strategic advice for entrepreneurs venturing into E-commerce. They stress the importance of considering tangible and intangible assets and efficient processes as the key success factors in E-commerce [14]. Nair (2017) discusses the transformative impact of E-commerce on employment, noting that while it may render some conventional jobs obsolete, it concurrently spawns new job opportunities, particularly in the IT sector [15].

5. Conclusion

The project of the Mobile-Based Used Vehicle Trading Application culminates with several key conclusions. Primarily, the application has been meticulously designed to align with its intended purpose. It has been developed using the Kotlin programming language, utilizing Android Studio as the primary development tool, along with other necessary software and hardware resources. This strategic choice of technologies underscores the application's robustness and potential for scalability. Currently, the application is still under development, with a vision of evolving into a refined and comprehensive tool accessible to a wide range of users. The aim is for the final iteration of this application to embody perfection in functionality and user experience, catering to diverse needs within the realm of vehicle trading. The introduction of this application is anticipated to contribute positively to the Indonesian economy, particularly by streamlining the process of buying and selling vehicles. It embodies a solution tailored to facilitate transactions, addressing both ease of use and security concerns. The commitment to continuous improvement and updates in features, menus, interfaces, and product offerings within the application is integral to its development roadmap. The goal is to establish this application as a leading platform in its domain, widely adopted and acclaimed for its efficiency, user-friendliness, and contribution to the digital transformation of vehicle trading in Indonesia. In summary, this project represents a significant step towards modernizing and enhancing the vehicle trading experience, aligning with the broader

trends of digitalization and E-commerce. It stands as a testament to the potential of technology in transforming traditional business practices, fostering economic growth, and meeting the evolving needs of consumers in the digital age.

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