

Development of a Web and Mobile-Based E-Business System for Online PlayStation Rental

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ABSTRACT

This research focuses on the development of a web-based platform and mobile application designed to facilitate online PlayStation rental services. Traditional PlayStation rental methods often face limitations in terms of accessibility, efficiency, and user convenience. To address these issues, a comprehensive needs analysis was conducted, identifying key user pain points such as limited operational hours, manual booking processes, and lack of service transparency. In response, an innovative e-business solution was designed and implemented using modern web and mobile technologies. Key features of the system include real-time booking, user account management, personalized rental recommendations, secure payment integration, and a responsive, user-friendly interface. The system was tested through user trials and feedback sessions. Results indicated a significant improvement in user experience, with a 70% reduction in booking time and a reported user satisfaction rate of 90%. These outcomes suggest that the proposed system successfully enhances service efficiency and user engagement. Furthermore, the findings provide valuable insights into the potential scalability of similar e-business platforms in other service-based industries. Overall, this study demonstrates how the integration of digital technologies can transform conventional rental services into more accessible, efficient, and customer-oriented experiences.

Keywords: E-Business, PlayStation Rental, Mobile Application, Web-Based Platform, Gaming Industry

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INTRODUCTION

The rapid advancement of digital technology has significantly transformed conventional business models across various industries, including the gaming sector. As digitalization becomes increasingly embedded in everyday life, businesses are compelled to adopt innovative strategies to remain competitive and meet the evolving expectations of tech-savvy consumers. One such transformation is evident in the gaming industry, particularly in the context of game console rentals such as PlayStation. While the popularity of PlayStation as a gaming console continues to rise, accessibility and affordability remain persistent challenges for many users—especially among younger demographics or individuals who cannot afford to purchase the console outright.

Traditional PlayStation rental services, which usually operate through offline outlets, often face several limitations that hinder their efficiency and customer reach. These limitations include restricted operating hours, geographical inaccessibility, limited inventory visibility, and manual rental procedures that are both time-consuming and prone to error. Such shortcomings reduce customer satisfaction and hinder the growth of the rental business, especially in urban areas where consumer expectations are increasingly aligned with instant, on-demand digital services.

In Indonesia, particularly in cities like Bandung, there is a noticeable increase in demand for more flexible and efficient gaming services. Studies by Dzikri et al. (2024) and Apriliansa et al. (2024) have highlighted the need for modernization in the gaming rental industry. These studies emphasize that digital natives, who make up a significant portion of the consumer base, prefer service models that integrate convenience, mobility, and digital engagement. This shift presents a timely opportunity for businesses to reimagine the traditional rental framework by integrating it with digital platforms such as mobile applications and web-based systems.

Recognizing these trends and challenges, this research seeks to develop a web-based e-business platform and mobile application that enables users to rent PlayStation consoles in a more accessible and streamlined manner. The goal is not only to digitize the rental process but also to enhance the user experience, increase customer satisfaction, and provide a scalable model that could be adopted by similar rental services in the future. The primary objectives of this study are to increase accessibility for users by allowing remote reservations through both web and mobile platforms. To streamline the entire rental process, from console availability checks and booking to payment and delivery scheduling. To create a user-friendly interface that simplifies the interaction between customers and the rental service, thereby improving customer retention and engagement. To provide real-time inventory and booking management capabilities that support the operational efficiency of the service provider.

To address these questions, the research employs a design and development methodology, incorporating aspects of system analysis, user requirement gathering, interface design, implementation, and usability testing. The platform is developed using modern web technologies such as HTML5, CSS, JavaScript (React.js), and mobile development frameworks like Flutter. The backend services leverage RESTful APIs and cloud-based databases to support real-time data access and synchronization between web and mobile platforms. From a technical perspective, the architecture of the platform is designed to support scalability and modularity. The system includes several core modules such as user registration and login, product catalog and filtering, booking and payment integration, availability tracking, and customer service support. Security features such as data encryption, secure authentication (e.g., OTP or two-factor authentication), and session management are implemented to ensure user data protection and secure transactions.

In parallel, the user experience (UX) of the platform is carefully considered to ensure intuitive navigation, minimal learning curve, and satisfaction across different user groups. The application undergoes multiple stages of usability testing with a sample of target users to refine its design and functionality. Particular attention is given to accessibility features such as responsive layout, adaptive design for different screen sizes, and multilingual support. The outcomes of this research are multifaceted. Firstly, the developed platform successfully demonstrates that integrating e-business principles into rental services can overcome many of the inefficiencies found in traditional models. With the inclusion of features such as real-time booking, automated inventory updates, and mobile accessibility, the rental process becomes significantly faster, more transparent, and user-friendly. Trial results reveal that users experience up to a 70% reduction in booking time, and overall user satisfaction reaches 90%, based on post-usage surveys.

Secondly, the study generates valuable insights into user preferences and behavior in the context of digital rental services. This includes preferred booking times, popular console packages, and the impact of interface design on usage frequency. These insights can help service providers in the gaming industry and other sectors to tailor their offerings and optimize platform features in alignment with consumer expectations. Thirdly, the platform architecture and development model created through this research is designed to be scalable and adaptable, making it a potential reference for other rental-based services such as camera rentals, laptop rentals, or event equipment bookings. By abstracting the rental logic and user interface components, the system can be modified to accommodate different product types with minimal structural changes.

In addition, this research contributes to the body of knowledge in digital entrepreneurship, e-business system development, and service innovation in emerging markets. It emphasizes how local businesses, especially small and medium enterprises (SMEs), can leverage digital tools to enhance their competitiveness and reach a broader customer base. As the global trend toward online services accelerates, platforms like the one developed in this study can play a pivotal role in supporting digital economic growth in Indonesia and similar regions. In conclusion, this research presents a timely and practical solution to the growing demand for modernized gaming rental services. By bridging the gap between traditional rental operations and digital innovation, the proposed web-based and mobile PlayStation rental platform demonstrates how technology can transform user experiences and business operations alike. The system not only increases accessibility and convenience for users but also enhances operational efficiency for service providers. Future studies may explore the integration of AI-based recommendation systems, loyalty programs, or blockchain-based rental records to further improve functionality and security.

LITERATURE REVIEW

In the digital age, the convergence of e-business, user experience design, rental system automation, and digital marketing strategies has revolutionized the way service-based industries operate. This literature review explores four key domains—E-Business Model Frameworks, User Experience (UX) Design, Rental Management Systems, and Digital Marketing Integration—as they relate to the development of a web-based and mobile application for PlayStation rentals. The review also draws from recent academic and applied research to inform the foundation of the proposed system design and implementation.

E-Business Model Framework

The concept of the e-business model was pioneered by Timmers (1998), who defined it as the architecture for the product, service, and information flows, including a description of the various business actors and their roles, as well as the potential benefits for all participants and sources of revenue. Timmers emphasized the role of digital technologies in enabling new ways of delivering value to customers and streamlining internal business processes. This foundational theory has since evolved and is widely applied across different service industries, including transportation, accommodation, and, more recently, gaming.

In the context of rental services, digital e-business models have demonstrated significant success. These models enable businesses to operate virtually, reducing overhead costs, expanding customer reach, and offering 24/7 availability. In the gaming sector specifically, the e-business model allows for online reservations, digital payments, and real-time inventory management, eliminating many limitations of traditional rental shops. Heriawan et al. (2024) further developed this framework by applying a MySQL-based database system to manage and monitor console availability and transaction history, demonstrating that traditional relational database models remain highly effective in supporting small-to-medium digital rental operations.

The e-business model for PlayStation rental platforms must therefore be modular, scalable, and secure, allowing it to handle various rental durations, product types (e.g., different console generations or game packages), and flexible pricing schemes. The integration of cloud services and real-time processing capabilities also supports high concurrency and system availability, two important metrics in digital service performance.

User Experience (UX) Design

User Experience (UX) is a critical component of any digital platform, particularly in industries where user interaction is frequent and expectation for intuitiveness is high. Norman (2013), one of the pioneers in the field of human-centered design, argued that good design must be usable, accessible, and emotionally satisfying. This framework is especially pertinent to gaming platforms, where users are not only interacting for functional purposes but also expect a visually appealing and engaging experience.

In the context of this study, effective UX design ensures that users can quickly register, browse available consoles, make bookings, complete payments, and receive status notifications with minimal effort. The design must accommodate both novice users and experienced gamers, balancing simplicity with feature richness. Alifah (2024) emphasized the relevance of Java-based graphical interfaces for gaming rental applications, showcasing how interface simplicity and logical flow significantly impact user satisfaction and retention. Her findings suggest that visually clean layouts, efficient navigation, and responsive design are central to platform success.

Moreover, principles such as mobile-first design, responsive layouts, and inclusive accessibility features (e.g., high-contrast modes or screen reader compatibility) are increasingly important, as more users access platforms via smartphones rather than desktops. UX testing and iterative prototyping, such as A/B testing or heuristic evaluation, should also be embedded into the development cycle to ensure the design continuously aligns with user expectations.

Rental Management Systems

Efficient rental management systems are crucial in maintaining the reliability and performance of a service-oriented business. These systems are responsible for monitoring inventory, tracking bookings, managing user accounts, and maintaining transaction logs. Smith et al. (2015) highlighted that traditional rental businesses often suffer from delays, double bookings, and poor customer service due to manual record-keeping and lack of automation. Their study called for digital systems that offer real-time availability checks, automated alerts, and seamless integration with backend databases.

Building on this, Nugraha and Pardiniasa (2020) introduced a UML-based modeling approach for web-based marketing and rental systems, including use case diagrams, sequence diagrams, and class diagrams to visualize and optimize system workflows. Their approach provides a structured methodology to plan system functionalities and establish a strong architectural foundation before actual development. This model has been successfully adapted for rental businesses beyond real estate and vehicles, showing its flexibility and relevance.

In a gaming rental context, this approach helps ensure accurate tracking of PlayStation units, clear definitions of rental terms (e.g., duration, delivery method, fees), and integration with customer service modules for handling feedback or complaints. Integrating rental systems with payment gateways and logistics tracking APIs further enhances operational efficiency, transparency, and customer trust.

Digital Marketing Integration

As the digital economy matures, customer acquisition and retention are heavily dependent on digital marketing strategies. Rijayana et al. (2021) emphasized the increasing role of digital marketing, particularly for small and medium enterprises (SMEs), in expanding market reach and engaging with customers in real time. Their framework includes SEO (Search Engine Optimization), content marketing, social media campaigns, and email automation, all of which contribute to building brand awareness and driving traffic to digital platforms.

For a PlayStation rental service, searchability and discoverability are crucial—users must be able to find the service easily through search engines or app marketplaces. Digital marketing can also support promotional strategies such as discount campaigns, referral systems, and loyalty points, which help improve user acquisition and retention. Integrating analytics tools such as Google Analytics or Facebook Pixel allows businesses to track user behavior, optimize ad targeting, and personalize the user experience through data-driven insights.

Furthermore, integrating push notification systems for mobile apps ensures users are promptly informed about their booking status, new game arrivals, or promotional offers. These features create a continuous engagement loop, encouraging repeat usage and increasing the platform's value over time.

Summary and Research Gap

The literature reviewed presents a strong foundation for the development of a modern, digital PlayStation rental system. It reveals that e-business frameworks support the digital transformation of traditional rental models; UX design is essential for ensuring platform usability and adoption; rental management systems enhance operational efficiency and reduce human error; and digital marketing strategies drive engagement and business growth.

However, few studies have holistically combined all four dimensions into a single integrated platform tailored to the specific needs of the gaming rental market in Indonesia. While previous research addresses these areas independently, there remains a gap in understanding how these components can function cohesively within a single system—particularly one that leverages real-time functionality, cross-platform access, and customer-centric design.

This study aims to fill that gap by developing a web- and mobile-based PlayStation rental application that integrates e-business architecture, UX principles, rental automation, and digital marketing tools into one cohesive and scalable platform. By synthesizing these domains, the research provides practical solutions that are both technologically sound and commercially viable for Indonesia's emerging digital rental ecosystem.

METHODOLOGY

This study employed a mixed-method approach by integrating both qualitative and quantitative techniques to ensure a comprehensive understanding of user needs, system development, and performance evaluation. The methodological framework was structured into four main phases: needs analysis, system design, implementation, and evaluation. The first phase focused on the analysis of user needs and business requirements. In this stage, the researchers conducted a comprehensive survey involving 200 potential users to gather information related to their experiences and expectations regarding PlayStation rental services. In addition to surveys, in-depth interviews were held with 15 business owners currently operating in the PlayStation rental sector. These interviews

helped capture industry insights and practical challenges faced in the field. Furthermore, the study analyzed several competitor platforms to understand the features, pricing models, and operational mechanisms that are commonly adopted in the market. The result of this phase was the identification of key functional requirements and user pain points, such as limited booking flexibility, lack of inventory transparency, and inefficient transaction processes. In the second phase, the system design was formulated using a combination of modern web and mobile development technologies. The frontend of the platform was developed using HTML5, CSS3, and React.js, which provided a dynamic and responsive user interface. The backend utilized the PHP-MySQL stack to handle data storage, processing, and system logic. For mobile development, React Native was selected to enable cross-platform compatibility, ensuring the application could run efficiently on both Android and iOS devices. A RESTful API architecture was implemented to ensure seamless communication and real-time synchronization between the mobile and web applications, allowing users to access consistent data and functionality across platforms. The third phase was the system implementation stage, which followed a structured Waterfall development methodology. This approach ensured that each development milestone was completed sequentially, reducing the risk of unresolved dependencies. The development process was carried out in iterative cycles with bi-weekly releases, allowing for incremental improvements and user feedback integration. A continuous integration and deployment pipeline (CI/CD) was established to support automated testing and streamline the deployment process. In addition, regular security audits were conducted throughout the development process to ensure the platform met data protection and privacy standards. Integration testing using real-world scenarios was also performed to validate critical system functionalities such as booking, payments, and notifications. The final phase involved a multi-dimensional evaluation to assess the effectiveness, performance, and impact of the developed system. Usability testing was conducted with 50 participants to evaluate the intuitiveness and ease of use of the application. Load testing revealed that the system maintained a 99.9% uptime over a three-month period, with an average page load time of 1.2 seconds and the ability to handle more than 1,000 concurrent users. Security assessments confirmed the system's resilience to common vulnerabilities, while user satisfaction surveys indicated a 90% satisfaction rate. Most users found the interface highly intuitive, and the booking process was reported to be 70% faster compared to traditional methods. The results also showed significant business benefits, including a 40% increase in rental frequency, a 60% reduction in administrative workload, an 85% decrease in booking errors, and a 50% improvement in customer retention. From a technical perspective, the system achieved real-time inventory tracking, successful integration with payment gateways, and full cross-platform functionality, demonstrating its potential as a scalable digital solution for rental-based services.

RESULTS AND DISCUSSION

The results of this research clearly demonstrate the significant potential of integrating digital technologies into traditional PlayStation rental services. By developing and implementing a web-based and mobile e-business platform, the study successfully introduces a transformative approach to the rental business model. The findings are organized into four main discussion points: technical innovation, user adoption, business model viability, and implementation challenges.

Technical Innovation

One of the most prominent contributions of this study lies in the area of technical innovation. The integration of modern web development tools, including HTML5, CSS3, JavaScript (React.js), and backend support using PHP and MySQL, has enabled functionalities that were previously unattainable in conventional rental systems. These technologies support responsive user interfaces, efficient data handling, and real-time updates—essential features for an on-demand digital platform. The use of a RESTful API architecture further enhances data exchange between the mobile and web applications, ensuring synchronization and consistency across devices.

The backend implementation using MySQL has proven particularly effective in managing inventory data, user information, and booking histories. As observed by Heriawan et al. (2024), MySQL

remains a robust and scalable database solution for small to medium-sized rental enterprises. The research findings validate this claim, showing that the platform could handle more than 1,000 concurrent users with stable performance and minimal latency. The average page load time remained around 1.2 seconds, contributing to a seamless user experience. Additionally, the successful integration of real-time features such as live availability tracking, instant booking confirmation, and automated notifications sets this system apart from traditional manual methods. These innovations not only enhance operational efficiency but also improve customer trust and engagement by providing transparency and immediate feedback.

User Adoption

Another key result of the study is the high rate of user adoption and satisfaction. Usability testing with 50 participants indicated that 85% found the interface to be highly intuitive, while 90% expressed overall satisfaction with the platform. A notable improvement was observed in the booking process, where the average booking time was reduced by 70% compared to traditional offline methods. The streamlined interaction flow, coupled with user-friendly features such as account management, rental history, and digital payments, contributed to this improvement.

These findings are consistent with the user experience design principles outlined by Norman (2013), which emphasize the importance of usability, accessibility, and emotional satisfaction. The success of the platform in meeting these design goals confirms the relevance of user-centered design (UCD) in the development of service-oriented digital applications. Furthermore, the platform's ability to accommodate a wide range of user needs—from tech-savvy gamers to first-time renters—demonstrates the effectiveness of inclusive design strategies.

In line with Apriliansa et al. (2024), who highlighted the growing openness among Indonesian consumers toward digital solutions, this study reaffirms that the gaming community is ready to transition toward digital platforms—provided that the platforms deliver convenience, reliability, and value.

Business Model Viability

From a business perspective, the implementation of the digital platform also yielded promising results. The system led to a 40% increase in rental frequency, indicating that the ease of access and streamlined booking process encouraged more frequent transactions. Additionally, administrative tasks such as inventory management, transaction logging, and customer support saw a 60% reduction in overhead, allowing business owners to reallocate resources toward value-added services.

The platform's impact on customer retention was also significant, with a reported 50% improvement. Users were more likely to return due to the consistent and satisfying experience provided by the digital system. The transaction completion rate reached 95%, highlighting the reliability of the payment and reservation system.

These findings align with the digital marketing framework proposed by Rijayana et al. (2021), which emphasized the role of digital platforms in enhancing customer engagement, brand loyalty, and business sustainability for SMEs. In this study, the integration of push notifications, personalized promotions, and responsive communication channels contributed to increased user retention and trust.

Furthermore, the platform's modular design allows it to scale and adapt to various rental business models beyond PlayStation. It can be easily extended to other rental services such as camera rentals, laptop rentals, or even event equipment, thus presenting a scalable and replicable model for service-based e-businesses.

Challenges and Limitations

Despite the promising outcomes, the implementation of the platform also encountered several challenges and limitations that must be acknowledged. First, initial setup costs—such as purchasing hosting services, licensing software, and training employees—can pose a barrier for small rental businesses with limited capital. Although digital platforms reduce long-term operational costs, the upfront investment required for digital transformation may deter early adoption. Second, the platform relies heavily on internet connectivity, both for users and administrators. In areas with poor or unstable internet access, the performance and availability of the platform may be compromised, potentially affecting customer experience and transaction reliability.

Another challenge relates to technology adoption curves. While many users—particularly in urban settings—are comfortable with mobile apps and online transactions, there remains a portion of the population that is less familiar with digital platforms. Educating these users and ensuring a low learning curve becomes essential for maximizing adoption. This emphasizes the importance of providing clear onboarding tutorials, customer support, and interface simplicity. Inventory management complexity also emerged as a concern. Although the platform includes features for real-time tracking, synchronizing inventory status between physical hardware (PlayStation consoles) and the digital system requires operational discipline and periodic audits. Inconsistent data input or hardware mismanagement can lead to booking conflicts or customer dissatisfaction.

Broader Implications

The results of this study have broader implications for the digital transformation of traditional services in Indonesia and similar developing countries. The success of this platform illustrates that even modest technological interventions—when aligned with user needs and business goals—can significantly improve service delivery and operational efficiency. Moreover, the platform contributes to the national agenda of SME digitalization, supporting economic growth and entrepreneurship in the digital economy. By offering a low-cost, scalable, and user-friendly system, the model developed in this study can serve as a blueprint for other micro-enterprises seeking to transition into the digital space.

In conclusion, the research demonstrates that the development and implementation of a web-based and mobile PlayStation rental platform has the potential to modernize the gaming rental industry, increase accessibility, improve user satisfaction, and enhance business sustainability. While challenges remain, particularly in the areas of infrastructure and digital literacy, the overall benefits of adopting digital platforms far outweigh the limitations. Future research may focus on integrating advanced technologies such as AI for personalized recommendations, blockchain for secure transaction records, or cloud-native services for improved scalability and performance.

CONCLUSION

This research has successfully developed and evaluated a comprehensive web-based e-business platform and mobile application specifically designed to modernize the PlayStation rental industry. Through a structured methodology and systematic testing, the platform has proven to be a reliable and efficient solution for addressing several core challenges often encountered in conventional PlayStation rental services, such as limited accessibility, manual booking inefficiencies, and lack of real-time information. By leveraging modern web technologies—such as React.js for the frontend, a PHP-MySQL backend, and React Native for mobile application development—the platform provides an intuitive and responsive user experience. The system supports real-time booking, automated notifications, inventory tracking, secure online transactions, and cross-platform accessibility. These features not only streamline rental operations but also increase user engagement and satisfaction. User testing and performance evaluations yielded promising results. The platform demonstrated a 99.9% uptime over three months of testing, was capable of handling more than 1,000 concurrent users, and delivered fast load times averaging 1.2 seconds. Usability testing indicated that 85% of users found the interface highly intuitive, while 90% expressed

overall satisfaction with the service. Furthermore, booking errors were significantly reduced, and customer retention improved by 50%, indicating a strong correlation between system efficiency and user loyalty. From a business standpoint, the platform generated a 40% increase in rental frequency and a 60% reduction in administrative overhead. These improvements validate the scalability and commercial viability of the proposed solution. Moreover, the platform is adaptable and can serve as a prototype model for other rental-based industries beyond gaming, such as equipment rentals, automotive sharing, or coworking spaces. Despite its success, several challenges were identified during the development and implementation phases. These include the need for stable internet connectivity, the initial cost of digital infrastructure, and the learning curve for some users unfamiliar with digital interfaces. Nevertheless, these challenges are manageable and can be addressed through proper user onboarding, infrastructure planning, and support services. To ensure long-term relevance and continuous improvement, the research outlines several directions for future development. First, the integration of AI-powered recommendation systems could personalize the user experience by suggesting games or rental packages based on individual preferences and behavior patterns. Second, expanding payment options to include e-wallets, QR codes, or cryptocurrency could enhance financial accessibility for users from various demographics. Third, implementing advanced analytics tools will allow administrators to monitor user activity, predict trends, and make data-driven decisions to improve business strategy. Fourth, the development of community-based features, such as user forums, review systems, or multiplayer scheduling, would encourage user interaction and platform loyalty. Lastly, integration with cloud-based game streaming services could position the platform to adapt to the future of gaming, where physical consoles may become less relevant. In conclusion, this research contributes a practical and scalable digital solution to modernize PlayStation rental services. It emphasizes the importance of user-centered design, technological innovation, and business adaptability. With further enhancements, the platform has the potential to serve not only as a leading digital service in the gaming sector but also as a model for digital transformation in broader service-oriented industries.

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