SPORTS SHOPPING SYSTEM

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ABSTRACT

This project aims to develop a brand-new online shopping platform for sports goods, focusing on addressing the major issues in the current e-commerce field, such as poor user experience, incomplete information, and difficulties for new merchants to join. The platform will offer self-service merchant registration, a secure transaction mechanism, and create a simple and personalized shopping process for consumers. Meanwhile, by leveraging data analysis, it will assist administrators and merchants in understanding user behavior, optimizing product recommendations and platform functions.
The platform development will mainly rely on Android Studio, using the Kotlin language and Jetpack Compose and Jetpack Components to build the user interface, in order to achieve a data-driven, user-friendly and efficient e-commerce system, thereby promoting small and medium-sized enterprises to integrate more fairly into the digital business environment.

Keywords: E-commerce, Jetpack Compose, Kotlin, Android Studio, Data Analytics, User Experience, SME, Online Shopping

1.0 INTRODUCTION

In the era of rapid digital transformation, sport online shopping has become an essential component of modern consumer behavior. With the continuous development of e-commerce technologies and the influence of the COVID-19 pandemic, more consumers are turning to online platforms for convenience and efficiency. According to Statista (2023), the global e-commerce market is projected to reach a transaction volume of 6.4 trillion US dollars by 2024, reflecting the immense potential for future growth. However, alongside this expansion, many existing e-commerce platforms—particularly those related to sport goods—still face significant challenges in usability, accessibility, and data transparency.

For small and medium-sized enterprises (SMEs), joining the online market often

involves navigating through complex registration procedures and using non-intuitive interfaces, which discourages participation and stifles business opportunities. On the consumer side, mobile shopping experiences are frequently hampered by poor navigation design, unresponsive interfaces, and inefficient purchasing flows. These usability issues result in decreased user satisfaction and abandoned purchases. Furthermore, most current platforms offer limited data visibility: consumers lack clear access to their order history and spending patterns, while merchants are unable to analyze sales performance or customer preferences effectively. This lack of insight not only weakens user engagement but also impairs strategic decision-making for business growth.

To address these issues, this project proposes the development of a mobile-focused, user-friendly sport online shopping platform built with Jetpack Compose and Kotlin in Android Studio. The platform aims to lower entry barriers for merchants by offering a self-service registration system and intuitive product management tools. It will enhance the mobile shopping experience through responsive UI design and streamlined ordering processes, allowing users to browse, add to cart, and pay in a single smooth flow. Additionally, the platform will integrate basic data analytics features to help users visualize their spending behavior and assist merchants in tracking sales trends. These solutions not only address the current pain points of both users and merchants but also lay the foundation for future enhancements such as personalized recommendations, inventory tracking, and advanced business intelligence tools.

2.0 LITERATURE REVIEW

The rapid development of sport online shopping platforms has significantly reshaped both consumer behavior and the retail industry. These platforms, which allow users to purchase sports-related products online, have grown alongside the wider expansion of e-commerce. As consumers increasingly rely on the internet and smart devices for shopping, traditional shopping methods are being replaced by faster, more convenient digital alternatives. Retailers—both new and established—are adapting to this shift, competing for market share by optimizing user experience, delivery services, and product personalization.

Sport online shopping has evolved considerably since the 1990s, beginning with pioneers like Amazon and eBay. Amazon initially focused on books but expanded into a broad marketplace, while eBay popularized online auctions. These platforms laid the foundation for modern e-commerce. As technology improved, so did online shopping—secure payment systems, real-time data analytics, and mobile applications have enhanced convenience and safety. Literature from researchers such as Chevalier and Goolsbee (2003) and Brynjolfsson et al. emphasizes how these innovations have influenced consumer expectations and forced traditional brick-and-mortar retailers to

adapt through omni-channel strategies.

Modern sport online shopping platforms are defined by several core features and functions. Key components include intuitive product navigation, secure and diverse payment options (e.g., credit card, e-wallet, cash on delivery), real-time inventory updates, and a fast, user-friendly checkout process. The ability to save shopping carts and enable one-click purchases further streamlines the buying experience, increasing customer satisfaction and conversion rates. These features are not only essential for improving user engagement but also for establishing competitive advantage in an increasingly saturated digital marketplace.

As the industry continues to evolve, ongoing research into platform characteristics, benefits, challenges, and future trends will be crucial. Important areas of exploration include personalized recommendations, customer service improvements, sustainability in packaging, and the integration of emerging technologies to further enhance the online shopping experience.

3.0 METHODOLOGY

This project adopts the Incremental Development Model, which involves dividing the system into multiple functional components (increments) that are developed, tested, and integrated in stages. This method enables early delivery of usable features, continuous feedback incorporation, and gradual refinement of the complete system. The development process was structured into four key increments: user registration and login, product browsing and shopping cart, merchant product management, and order history with consumption analysis. Each stage was individually tested and refined before proceeding to the next, ensuring system stability and adaptability.

The model was chosen for its flexibility in accommodating requirement changes, its ability to reduce risk by isolating issues within specific increments, and its support for early user interaction with functional modules. Additionally, the modular nature of the approach facilitates easier maintenance and future expansion—such as integrating recommendation systems or real-time payments—without overhauling the entire system. This method is particularly effective for projects with limited resources, allowing focused development on one feature at a time and ensuring higher efficiency and manageability.

3.1 Definition of user needs

The development and testing of the "QuickPick" Android application were driven by a clear understanding of the core needs of two primary user groups: **general consumers** and **administrative users**.

For **general users**, the main needs identified include:

> **Convenient product browsing**: Users require a fast, responsive, and visually clear interface to explore sports equipment. This was addressed through a Jetpack Compose-based grid layout with image loading, categorized displays, and smooth scrolling.
>
> **Efficient shopping experience**: Customers expect seamless shopping flow—from adding items to a cart, reviewing orders, and completing purchases with minimal steps. This was ensured through simple navigation and session tracking via SharedPreferences.
>
> **Transparency in purchase history**: Users want to view their past orders and understand their consumption patterns. Therefore, the app includes an order history module and spending analysis categorized by product type.

For **administrative users**, the identified needs include:

> **Simple product management**: Admins must be able to add, edit, or delete products easily. This was realized through a structured form interface, backed by local SQLite storage.
>
> **Data input validation**: To prevent errors, form validation was essential. Both black-box and white-box tests ensured that inputs such as product name and price followed the correct format.
>
> **Feedback and confirmation**: Admins needed clear success/error messages during product management actions. This was implemented using responsive Toast messages and on-screen cues.
>
> **Usability and clarity**: Through usability testing, it was found that input labels, placeholders, and feedback mechanisms were vital for smooth admin interactions, especially in the "Add Merchant Data" feature.

In summary, user needs were carefully analyzed and validated through systematic development and testing. The application is designed not only to meet basic e-commerce expectations but also to provide a reliable, intuitive, and feedback-rich environment for both end-users and administrators.

3.2 Functional Requirements

The *QuickPick* sports equipment shopping system is designed to serve both end-users and administrators. Key functional features include:

User Functions:
Users can register and log in securely, browse and search products through a categorized catalog, add or remove items in a shopping cart, place orders, view order history, and track category-based spending.

Administrator Functions:
Administrators can manage product listings (add, edit, delete), monitor and verify orders, and maintain product inventory via a backend interface. Role-based access control enables secure admin management.

Shopping Cart and Order Processing:
Users can manage item quantities, proceed with simplified checkout, and receive order confirmations. Orders are automatically moved to history after payment.

Basic Analytics:
The system captures user behavior, such as browsing and purchasing patterns, for potential insights and future recommendations.

3.3 Non-Functional Requirements

To ensure the system runs efficiently and meets user expectations, the following non-functional attributes are specified:

Performance:

Supports up to 1,000 concurrent users

Page load time should be under 3 seconds during normal usage

Security:

All sensitive data (e.g., passwords, order details) must be encrypted

Role-based access control for both admin and user levels

Usability:

Intuitive and responsive user interface across mobile and desktop devices

Clear navigation and labeling for ease of use without training

Reliability:

99.9% system uptime

Automatic database backup every 24 hours

Scalability:

System should support integration of new features (e.g., loyalty programs, real-time payment) without major changes to core architecture

4.0 RESULT AND DISCUSSION

During the implementation of the Jetpack Compose-based Android application for the online vending system, several unforeseen challenges were encountered—most notably with image handling. Loading product images from URLs caused noticeable delays and performance issues, while the integration of third-party image libraries was hindered by insufficient documentation. These problems affected the smoothness of the user interface and slowed down development. To overcome this, the Coil library was adopted, leveraging placeholders and crossfade animations to enhance image loading and overall user experience.

Despite these challenges, the core implementation was completed successfully. The system includes user login and session handling via SharedPreferences, responsive product grids with categorized listings and images, and a complete order management module built using SQLite (via OrderDBHelper and ProductsDBHelper). Additional features such as animated UI components, scrollable layouts, and category-wise spending analysis from parsed order data further enrich the user experience. The app also applies basic UI theming with gradient backgrounds and custom shapes, delivering a visually appealing and functional interface that meets the project's intended goals.

4.1 Interface Design and Layout

This section provides a visual overview of the final product—"QuickPick: Online Sports Equipment Shopping App"—through a series of interface screenshots captured from the working Android application. The screenshots illustrate key features and functionalities implemented during the development process, including the user login screen, product browsing grid, shopping cart interface, order confirmation page, and the administrator dashboard. Each interface was designed using Jetpack Compose to

ensure responsiveness and modern aesthetics across different screen sizes. The visuals demonstrate how core e-commerce features—such as user registration, product listing with images and categories, cart management, and order tracking—have been effectively integrated into a clean and intuitive layout. Additionally, the administrator view showcases backend capabilities like product editing, order status updates, and a basic sales overview categorized by user spending behavior. These screenshots not only reflect the system's functional completeness but also highlight the visual consistency and user-friendly design achieved through MVVM architecture, local database integration (SQLite), and session management using SharedPreferences. Overall, the product screenshots serve as concrete evidence of the app's successful implementation and readiness for further testing or deployment.

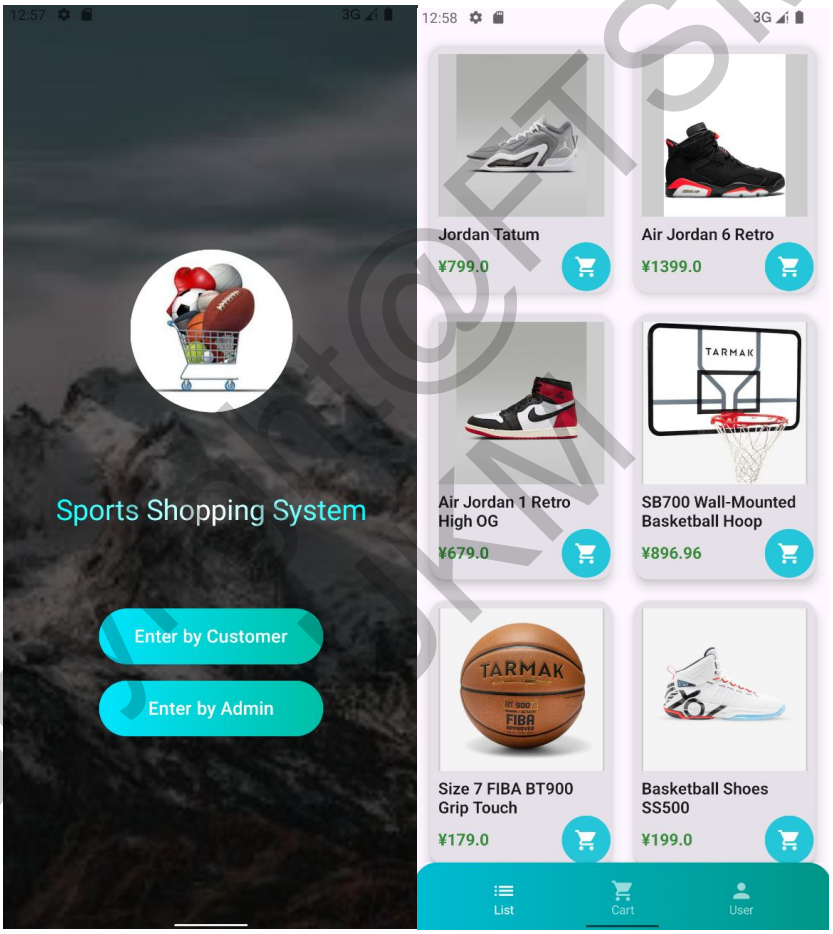

Figure The initial page and the product browsing page

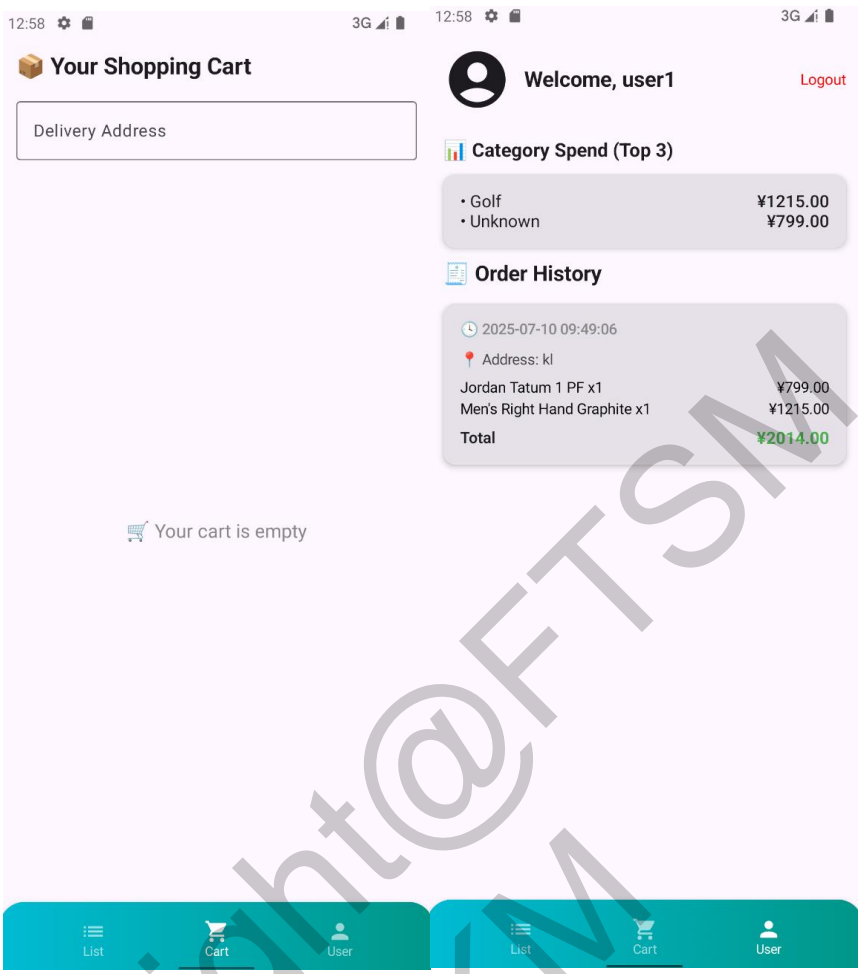

Figure Shopping cart page and user page

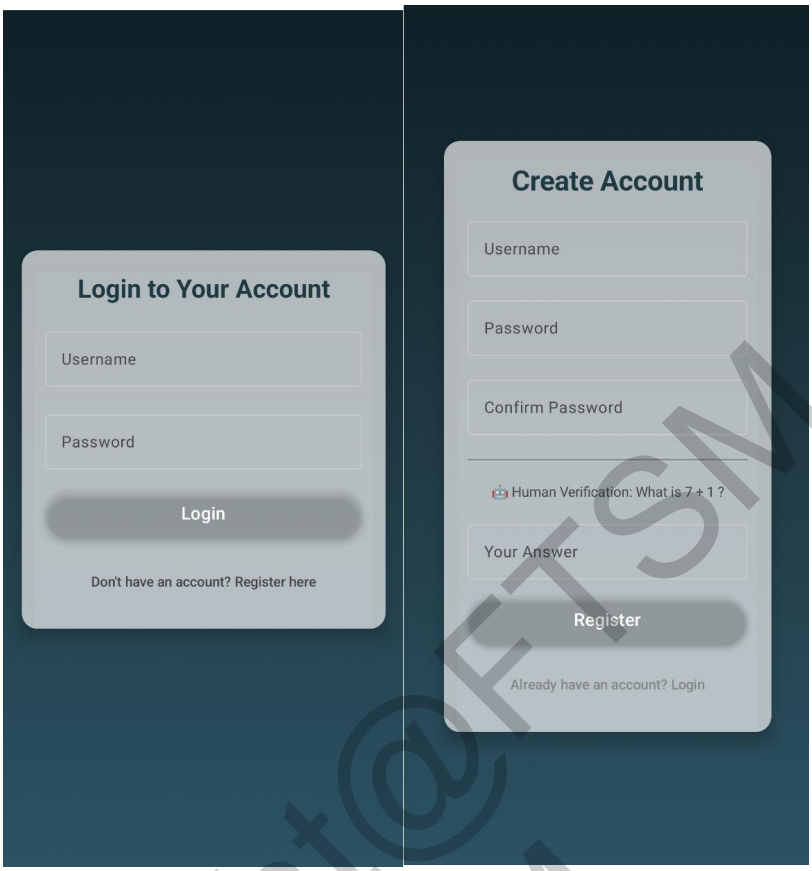

Figure Login page and registration page

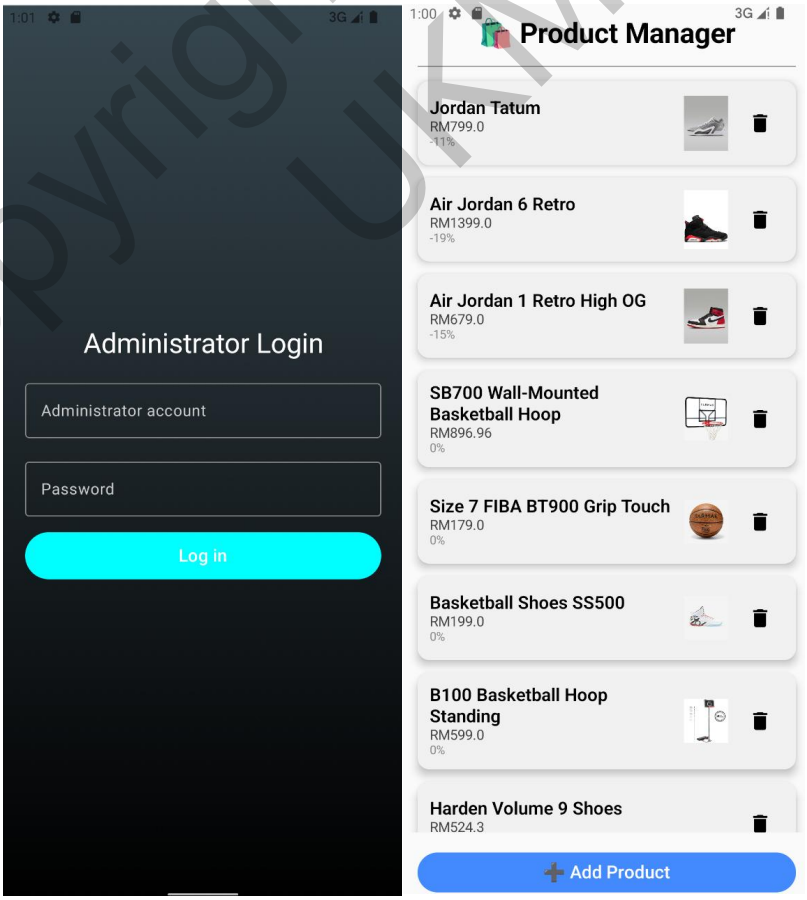

Figure Administrator login page and management product page

Figure Add product page and user historical order page

4.2 Testing

This chapter presents a comprehensive overview of the testing activities conducted on the "QuickPick" Android application, focusing on ensuring the reliability, functionality, and usability of both user-side and admin-side features prior to deployment. The testing process followed a structured approach that included planning, black-box and white-box test execution, user acceptance testing (UAT), and usability evaluation. Key areas under validation included user authentication, product display, cart operations, order tracking, and administrative functions such as product management and order overview.

A significant part of the testing centered around the **"Add Merchant Data"** feature, which enables administrators to input new product information into the system. The **Black Box Testing** technique was employed to simulate real user inputs and validate form behavior based on expected output, while **White Box Testing** was used to examine the internal logic of the addProduct() function, including condition handling and SQLite database interactions. Different input scenarios were tested, including empty fields and invalid price formats, confirming that the function responded correctly with appropriate error messages or successful insertion.

In addition, **User Acceptance Testing (UAT)** was carried out to verify the feature's alignment with real administrative workflows. The function was accepted after demonstrating expected behavior across multiple scenarios. **Usability Testing** further refined the interface by identifying opportunities to enhance clarity and feedback, such as adding placeholders and previewing image URLs.

Test execution utilized Android Studio tools like **Logcat** and **Database Inspector** to trace logic branches and confirm data persistence. The **test results** confirmed that all logical paths were correctly covered, invalid data was blocked effectively, and valid data was stored accurately in the local database. These successful test outcomes ensure that the application meets functional requirements and is robust enough for future updates and maintenance.

5.0 CONCLUSION

In summary, this project successfully designed and implemented an Android-based Sport online shopping platform that addresses key pain points in modern e-commerce: user experience, transparency, and merchant accessibility. By focusing on simplicity, usability, and modular development, the application delivers a reliable mobile shopping solution suited for small to medium businesses.

While the system is currently limited in its commercial scalability and advanced AI integration, it establishes a strong foundation for future development. The project proves the feasibility of building a lightweight yet functional e-commerce platform using modern Android tools, and paves the way for more intelligent, secure, and scalable digital retail systems in the future.

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