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Mobile application for order management: Kerly Commissary case in the El Carmen sector

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Abstract

This study developed a mobile application for the Kerly grocery store in El Carmen, Ecuador, to manage online product orders and improve sales. The application will use MVC architecture and SCRUM methodology, with Android Studio as the IDE, Kotlin for logic, Flutter for the user interface, Firebase for high-quality applications, and PHP for backend development. The project aims to improve customer service, increase the customer base, and increase competitiveness. The methodology was consolidated around bibliographic, field, and applied research, including interviews and surveys, to collect information and evaluate user satisfaction. The application consisted of functional requirements such as user management, product management, purchase processing, sales indicators, order delivery, notifications, promotions, and transaction security. With multi-platform-compatible design, scalable databases, and secure authentication guarantees to protect user data. The system was established with an intuitive, easy-to-maintain interface that complies with IEEE 830 standards. The satisfaction findings from 96 surveys indicate that 69.4% of users found the application familiar and 91.9% believed it was beneficial. The proposal proposes an online system for customers of the Kerly grocery store to place orders and purchase products from home. In conclusion, it is maintained that any mobile application developed using agile techniques improves the user experience and speeds up transactions with a maximum level of security, contributing to greater customer satisfaction and higher conversion rates.

Keywords: Mobile application, MVC, SCRUM, Android Studio, Flutter, Firebase.

1. Introduction

In the vast field of business, the development of mobile applications and the issue of transaction security represent a significant challenge for researchers (Diallo, A., 2024). Broadly speaking, the practice of conducting business or offering services through a mobile application connected to the internet, enabling transactions involving any amount of money using a mobile device, is referred to as mobile commerce (Narayanan, M., 2023).

In this context, this study has developed a mobile application proposal to manage online product orders for the grocery store El Comisariato Kerly in Cotopaxi, El Carmen. This business lacks a mobile application to place online orders for essential goods due to underlying issues with security and restrictions, forcing customers to visit the supermarket in person. Pregnant women and young children are often reluctant to go, leading to a 20% decrease in monthly sales. This is attributed to vehicular restrictions and fear of crime, affecting 300 customers from other areas. This mobile application development aims to expand marketing and enable customers to monitor the status of deliveries.

However, since mobile commerce involves conducting online transactions, it presents greater security risks than traditional e-commerce. Moreover, it is noteworthy that standard online authentication technologies struggle to achieve consistent and long-term success in mobile transactions (Khan et al., 2023). In this sense, necessary security requirements to safeguard private information and sensitive data in e-commerce are often unmet due to the extensive use of mobile devices for online payments.

To address these issues, a technological proposal has been adopted to enhance sales and facilitate product inquiries through a mobile application. This research project aims to implement IEEE 830 for software requirements, MVC architecture, and SCRUM methodology for rapid and reliable mobile application development (Rachmawati et al., 2023). Tools such as Android Studio as the IDE (Mohd et al., 2017), Kotlin for logic (Ardito et al., 2020), Flutter for the user interface (Jadaun et al., 2023), Firebase for high-quality applications (Khawas & Shah, 2018), and PHP for backend development (Sriram & Akilan, 2022) were employed. This will enable effective integration between the frontend and backend for order management, allowing customers to easily select and place orders with the supermarket.

The online ordering application for high-quality products for El Comisariato Kerly in El Carmen utilized the FIGMA design tool, facilitating easy management and data access (Jain, A., 2023; Yoyon E., 2022). Additionally, MySQL is used as the database management system (Dahunsi et al., 2022; Rawat et al., 2021). The mobile application focuses on enabling online queries and orders using Android Studio and programming languages under Kotlin, Dart, Flutter, and JQuery Mobil libraries (Kinari et al., 2024; Vindua et al., 2024). The application will also provide excellent customer service, significantly contributing to increasing the customer base and competitiveness. Furthermore, it will be distributed for Android platforms, saving customers time, reducing paper bills, and providing detailed information on offers and promotions.

In this context, this study focused on developing and evaluating the mobile application for order management for El Comisariato Kerly, located in La Maná, El Carmen Parish, in the province of Cotopaxi, Ecuador. The study employed an MVC architecture for the mobile application and the SCRUM methodology (Garcia et al., 2020), with functional requirements for user management, product management, purchase processing, sales indicators, order delivery, notifications, promotions, and transaction security. Additionally, it includes a section for acceptance testing and evaluating user satisfaction with the mobile application.

2. Methodology

The methodology used in this research includes bibliographic research, field research, and applied research. Bibliographic research involves documenting information from primary sources, while field research entails extracting data through techniques such as interviews, surveys, or questionnaires. Applied research focuses on problem-solving and capturing scientific knowledge in a technological solution.

The methodologies employed for the technological proposal include the inductive method, which gathers information from various sources, and the deductive method, which proceeds from general to specific. Interviews and surveys were used for the mobile application development, including interviews with the manager of El Comisariato Kerly in the El Carmen area.

A survey instrument was applied to a group of individuals using standardized questioning procedures to obtain quantitative measurements of objective and subjective population characteristics through field research. The economically active population of La Maná canton, totaling 42,216 individuals, was considered. The sampling strategy involved sample calculation, resulting in a total of 96 surveys to be conducted.

2.1 Description of the Mobile Application

The methodical development of the mobile application involved the use of an MVC architecture, the SCRUM methodology (Rajasekaran et al., 2023), and use case diagrams for the application's requirements (Hendi S., 2021). Additionally, the verification of the Comisariato Kerly application was performed using Android Studio and MySQL

(Daoudi et al., 2019), alongside transaction testing in sandbox mode for the payment gateway during virtual purchases (Mahardika et al., 2024).

The application includes functional requirements such as user management, product management, purchase processing, sales indicators, order delivery, notifications, promotions, and transaction security. It should enable online purchases with acceptable response times, be compatible with multiple platforms using Flutter (Jadaun et al., 2023; Siddeeq & Dilkhaz, 2022), utilize scalable databases such as Firebase and MySQL (Ohyver et al., 2019), ensure secure authentication, and protect user data during transactions (Khan et al., 2023). The interface must be intuitive and minimally accessible, with clear navigation options (Galimova, 2021).

The application should be designed with maintainability in mind, using MVC architecture, clear code documentation, and a user manual. System availability must be guaranteed at least 99% of the time, and compliance with IEEE 830 standards is required (Zapata et al., 2018). The development methodology must utilize SCRUM for iterative and collaborative development (Rahman et al., 2018).

3. Results

3.1 Development and Evaluation of the Mobile Application for Order Management

The need for developing a mobile application for order management arose because the store manager reported that the current sales, inventory, and billing system only manages data but does not generate strategic reports for decision-making. Based on this, the system requirements for the mobile application were outlined, including account creation (Figure 1), adding products to the cart (Figure 2), removing products (Figure 3), processing payments, and confirming orders from the shopping cart (Figure 4), as well as managing clients, products, and orders.

The system also allows users to view categories, products, shopping carts (Figure 5), order histories, sales indicators, and manage users, clients, products, and orders (Figure 6). These requirements are crucial for effective decision-making and ensuring the accurate supply of products and services at El Comisariato Kerly in the El Carmen area.

Figure 1. Home screen

Figure 2. Product section

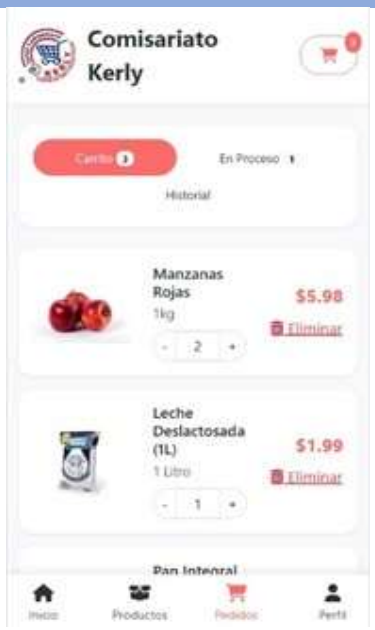

Figure 3. Order section - Customer

Figure 4. Order request process

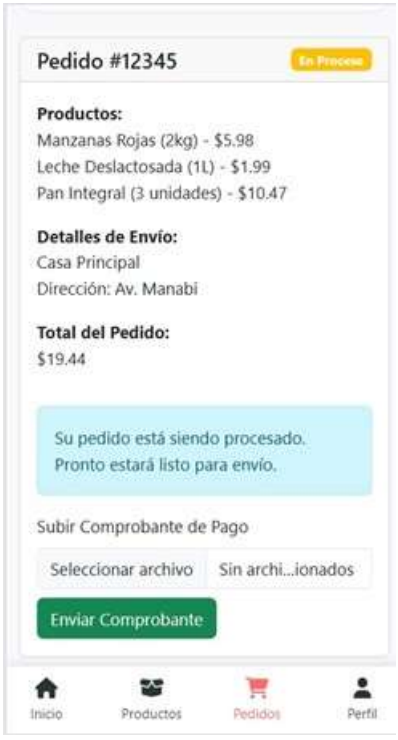

Figure 5. Order status

Figure 6. User profile section

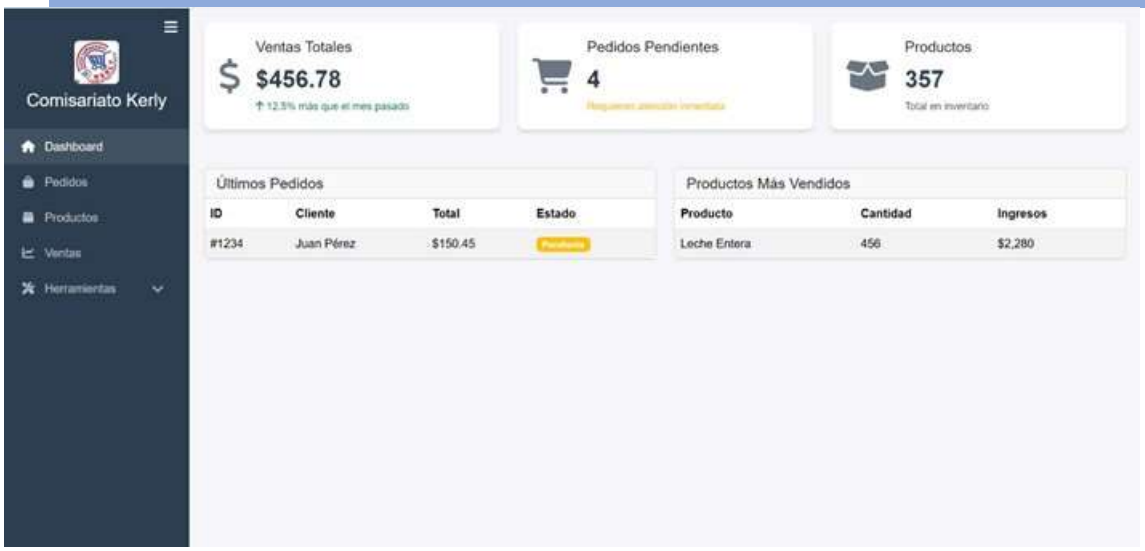

Figure 7. Dashboard of a business management system for "Comisariato Kerly."

The "Comisariato Kerly" dashboard displays key business performance indicators, such as total sales, pending orders, product inventory, and best-selling products (Figure 7). It provides a summary of sales, pending orders, and revenue, enabling managers and administrators to make informed decisions and monitor business performance. The dashboard also shows the latest orders and the top-selling products.

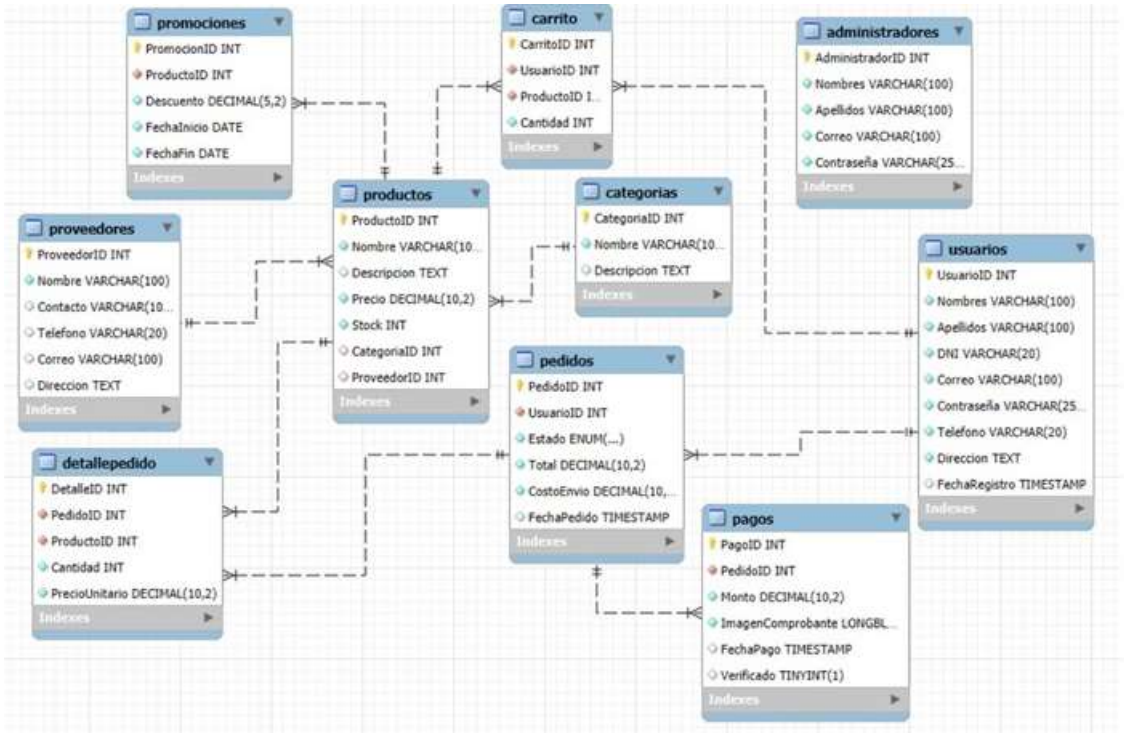

Figure 8. Entity Relationship Diagram.

Figure 8 shows an Entity Relationship (ER) diagram for an order and promotions management system. It consists of several entities, including suppliers, promotions, products, categories, orders, payments, users, and administrators. The relationships between these entities are represented by lines connecting the elements, enabling an easy understanding of the system's structure. Each entity has several indexes that represent key data fields, providing a comprehensive view of the system's relationships and interactions.

3.4. User Satisfaction Evaluation

The following pie charts provide a clear visual representation of the results from various surveys on different topics of interest in this study.

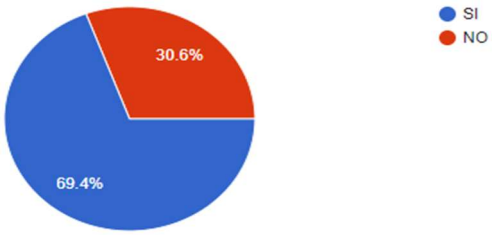

Figure 9. Are you familiar with any mobile application for placing orders in the La Maná canton?

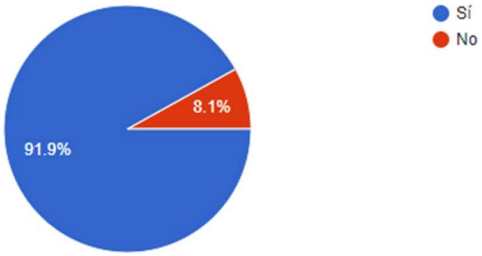

Figure 10. Do you think it would be beneficial for Kerly Commercial to implement a technological tool to place online orders?

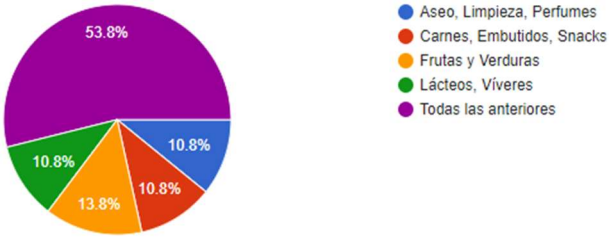

Figure 11. What type of products would you like to be available in the Kerly Sales Mobile Application?

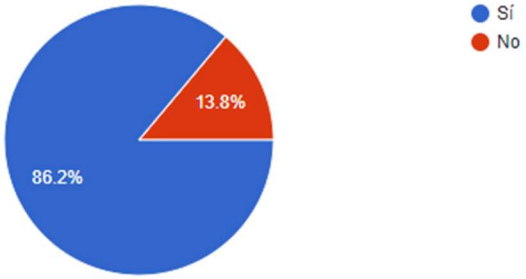

Figure 12. To ensure your well-being, would you like your orders to be delivered to your home anywhere in the city of La Maná?

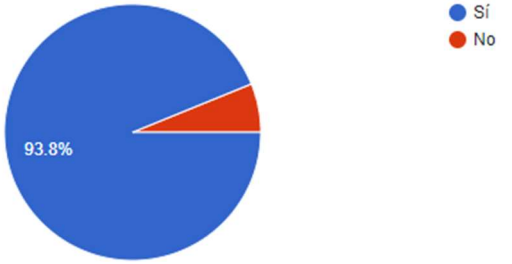

Figure 13. Do you find it useful that Kerly Sales provides information about its promotions through a mobile application?

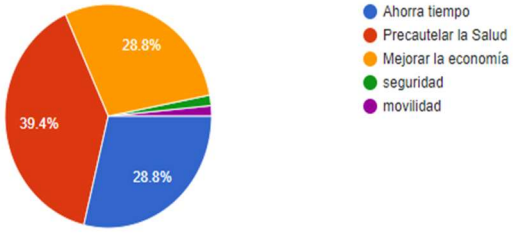

Figure 14. What benefits would you get from making your purchases online at the Kerly Mall?

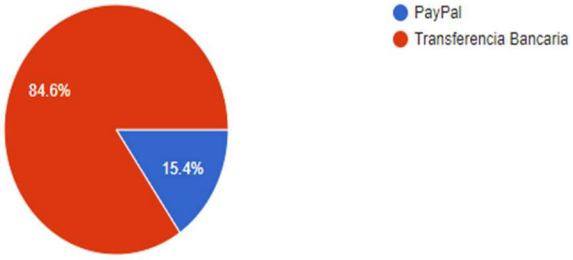

Figure 15. What payment method would you prefer to place your online orders at Comercial Kerly?

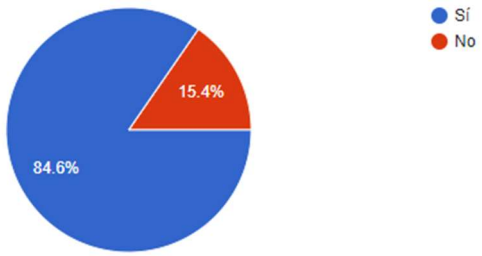

Figure 16. If you find our Mobile App service satisfactory, would you recommend it to new customers?

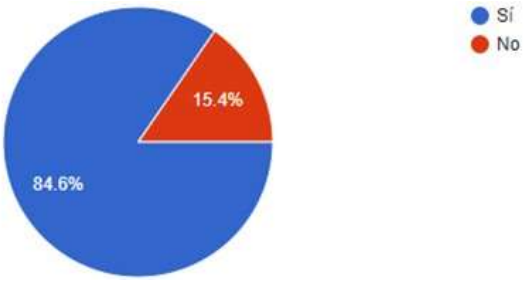

Figure 17. Would you like to be able to make purchases through an app anytime, anywhere?

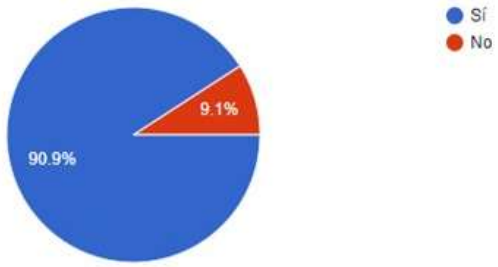

Figure 18. Would you consider it useful to have a specific mobile application for Comercial Kerly?

The interpretations of the findings presented from Figure 9 to Figure 18 show pie charts representing the survey results on various questions. A total of 69.4% of respondents are familiar with a mobile application for placing orders in the La Maná canton, while 91.9% believe it is beneficial for Comercial Kerly to implement an online ordering tool. The survey results vary by category, with different percentages for health precautions, economy, time savings, safety, and mobility. Payment methods were favored by 84.6% of respondents, and 84.6% recommended the mobile application to new customers. Lastly, 90.9% consider a specific mobile application to be useful for Comercial Kerly.

Interpretation of Findings

The interpretations of the findings presented from Figure 9 to Figure 18 include pie charts that depict the results of surveys on various questions. A total of 69.4% of respondents are familiar with a mobile application for placing orders in the canton of La Maná, while 91.9% believe it would be beneficial for Comercial Kerly to implement an online ordering tool. The survey results vary across categories, with different percentages allocated to health precautions, economy, time savings, safety, and mobility. Payment methods were favored by 84.6% of respondents, and 84.6% also recommended the mobile application to new customers. Finally, 90.9% consider a dedicated mobile application to be useful for Comercial Kerly.

4. Discussion

The proposal aims to provide customers with an online system to search for products offered by the Kerly grocery store, allowing them to place orders and make purchases from home. The integration of a payment gateway has enhanced the user experience (Blessing, M., 2024; Wang, J., 2021), streamlined transactions, and increased security. This aligns with the contributions of Yasmeen E. (2020), resulting in higher customer satisfaction and conversion rates. The online sales management system also offers environmental benefits by automating the inventory process and reducing the need for large-scale printed invoices. Overall, the proposal seeks to provide a more efficient and secure solution for e-commerce.

5. Conclusion

The mobile application for online ordering on the Kerly commissary server was developed using software development methodologies, agile techniques, modeling tools, and requirement specification standards. The project has proven to be efficient, intuitive, and has passed verification tests, improving user experience and optimizing internal marketing processes. The application has enhanced customer satisfaction and conversion rates, becoming an efficient and secure solution for e-commerce. This marks a significant step in modernizing the commissary's services. The use of SCRUM is recommended for the implementation of IT systems due to its agile approach and focus on creating intuitive software. Proper management of mobile applications is emphasized, including the development of

a user manual for training purposes. Additionally, the creation of new versions with additional modules is encouraged to provide greater flexibility.

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