International Journal Software Engineering and Computer Science (IJSECS)
4 (1), 2024, 293-300
Published Online April 2024 in IJSECS (http://www.journal.lembagakita.org/index.php/ijsecs)
P-ISSN : 2776-4869, E-ISSN : 2776-3242. DOI: https://doi.org/10.35870/ijsecs.v4i1.2325.

RESEARCH ARTICLE Open Access

Design and Development of an Android-Based Point of Sale Application: A Case Study of Warung Dapur Barokah, Pangkalpinang

Ahmad Hanif *
Department of Informatics, Faculty of Science and Technology, Universitas Teknologi Yogyakarta, Special Region of Yogyakarta, Indonesia.
Corresponding E-mail: ahmadhnif47@gmail.com

Agus Suhendar
Department of Informatics, Faculty of Science and Technology, Universitas Teknologi Yogyakarta, Special Region of Yogyakarta, Indonesia.
E-mail: agus.suhendar@staff.uty.ac.id

Rr. Hajar Puji Sejati
Department of Informatics, Faculty of Science and Technology, Universitas Teknologi Yogyakarta, Special Region of Yogyakarta, Indonesia.
E-mail: hajarsejati01@gmail.com

Received: March 1, 2024; Accepted: April 1, 2024; Published: April 30, 2024.

Abstract: Warung Dapur Barokah is a food stall in Pangkalpinang City and was founded in 2022. This application was designed to overcome obstacles that generally arise in manual transaction processes, which are often slow, inefficient, and difficult to manage accurately sales data. This application was developed using Android Studio and adopted the Kotlin programming language. Apart from that, the database section uses Firebase. I am using Firebase because Firebase has a real-time databaseRealtime that can update data in the database in realtime. This will make the transaction data storage process synchronized, fast, and optimal. The hope is that the results of implementing this application will include increased efficiency and speed in the transaction process and potentially improve the profitability of Warung Dapur Barokah's operations. This innovation is hoped to positively contribute to advancing the operational performance of this food stall in the current digital era, as well as creating effective solutions to increase the competitiveness and sustainability of local businesses in the culinary sector.

Keywords: Android; Cashier Application; Android, Cashier; Firebase.

1. Introduction

Technology is indispensable in nearly every facet of human life in contemporary society. The pervasive influence of information and communication technology (ICT) has revolutionized the way people conduct their daily activities. This transformation is largely attributed to technology's unparalleled convenience and efficiency in completing tasks. Among the various technological advancements, smartphone technology is a ubiquitous tool that has permeated diverse domains, ranging from entertainment and education to business operations. The Android operating system has emerged as a predominant platform in this digital landscape [1]. The ubiquitous presence of smartphones necessitates individuals' adaptation to this evolving technological milieu. Smartphones, which function as multifaceted electronic communication devices, boast features akin to traditional telephones while offering unparalleled practicality, portability, and an array of additional functionalities. With the continual evolution of smartphone technology, there is a growing expectation that these devices will furnish indispensable amenities, ensuring seamless integration into daily life routines [2]. Consequently, the selection of smartphones as a platform for application development is not solely contingent upon their user-friendly interfaces; rather, it is predicated on their inherent flexibility and adaptability.

Warung Dapur Barokah, situated in Pangkalpinang, emerges as a case study encapsulating the symbiotic relationship between traditional practices and technological innovation. Specializing in diverse culinary offerings such as Pempek, Tekwan, and Lenggang, this establishment currently relies on a manual cashier system characterized by pen-and-paper transactions. This antiquated modus operandi is time-consuming and susceptible to errors, impeding the seamless completion of transactions. Consequently, an imperative need arises to develop a digital cashier application to facilitate the operational inefficiencies plaguing Dapur Barokah.

An application, in its essence, represents a meticulously crafted program designed to fulfill specific user needs while facilitating seamless interaction with other software applications. By conceptualizing and implementing an Android-based cashier application, the aim is to streamline financial management processes at Dapur Barokah, thereby augmenting operational efficiency and effectiveness. This endeavor underscores a concerted effort to harness the transformative potential of technology in revolutionizing traditional business practices [3]. Through the fusion of innovative technological solutions and conventional business models, the aspiration is to engender a paradigm shift towards enhanced operational efficacy and profitability within the culinary sector. In light of the preceding discourse, this research explores the intricacies of developing an Android-based cashier application tailored to the unique operational requirements of Dapur Barokah. Through an interdisciplinary approach melding technological innovation with business pragmatism, the study seeks to elucidate the transformative impact of digital solutions on traditional business enterprises. As the narrative unfolds, it becomes increasingly evident that integrating technology into conventional business practices represents a pivotal step toward navigating the difficulties of the contemporary digital landscape.

2. Research Method

The research method for developing an Android-based cashier application follows a structured and systematic approach, which includes analysis of the current system, system design, selection of software and hardware, and a review of related literature. These stages are designed to ensure the effectiveness and smooth implementation of the research, as well as to establish a solid foundation for the development of the proposed cashier application.

2.1 Current System Analysis

An initial analysis was conducted to evaluate the transaction management system at Warung Dapur Barokah. This analysis revealed that the current system still relies on manual processes, which are error-prone and time-consuming. Additional problems arise in searching for transaction data recorded in manual notebooks, where the process tends to be slow and inefficient. In this context, digital solutions are needed to increase the efficiency and accuracy of transaction processes.

2.2 Proposed System Design

Based on the results of this analysis, a cashier application concept was formulated and designed to overcome the weaknesses of the current system. This application is designed with key functions, including storing menu and transaction data and the ability to calculate total transactions. The proposed system architecture design (Figure 1) allows cashiers to efficiently enter transaction and food menu data into the application, with the data stored and managed via the Firebase platform. Technology choices such as Firebase

as a database, Android Studio as an application development environment, and the Kotlin programming language were chosen based on efficiency, flexibility, and reliability considerations.

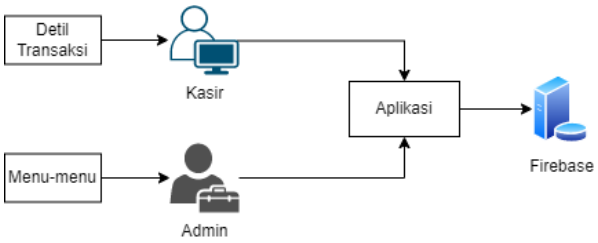

Figure 1. Proposed System Architecture

2.3 Software and Hardware Selection

The success of developing this application depends greatly on selecting the right software and hardware. Therefore, this research chose software such as the Windows 11 operating system and Android Studio as the main development environment [4]. The Android operating system was selected because of its popularity and ability to support mobile application development [5]. Android Studio was chosen as the IDE because of its simplicity and inefficient Android application development [6]. In addition, Firebase was selected as a database platform because of its ease of use and ability to provide cloud services directly connected to applications [7][8]. The Kotlin programming language was chosen because of its advantages in overcoming several common problems in Android application development, such as NullPointerException and writing code that is shorter and easier to read compared to Java [9][10]. Regarding hardware, the Asus A442UR laptop and Redmi Note 10 Pro smartphone were chosen. This laptop has adequate specifications for application development, with an Intel Core i5-8250U processor, 12GB memory, and 256GB SSD + 1TB HDD storage. Meanwhile, the Redmi Note 10 Pro smartphone has a Snapdragon 732G processor, 8GB memory, and 128GB storage, making it a suitable device for testing Android-based cashier applications.

2.4. System Design

The system design is realized in the form of an activity diagram, which visually depicts the workflow or business process of the proposed cashier application. This activity diagram includes customer ordering, inputting transaction data by cashiers, storing transaction data, and creating transaction reports. Thus, the activity diagram becomes a useful guide in designing and implementing the main features of the proposed cashier application.

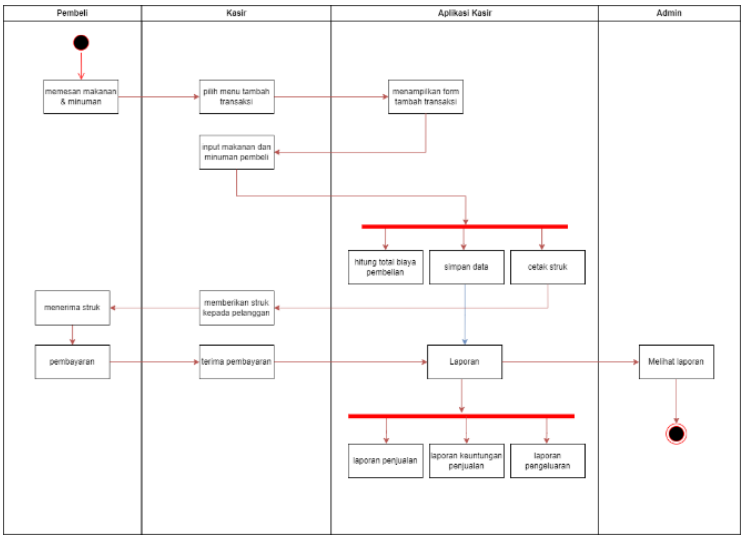

Figure 2. Activity Diagram

The structured and detailed methodology provides a solid foundation for achieving research objectives in developing this Android-based cashier application. By paying careful attention to each stage, it is hoped that the resulting cashier application can make a significant contribution to increasing the efficiency and effectiveness of transaction management at Warung Dapur Barokah, as well as becoming an inspiring model for the development of similar applications in the future.

3. Result and Discussion

3.1 Results

Applications that are currently in the development stage use the Kotlin programming language:

1) When the application is opened, a splash screen displays the start page. After the Splash Screen is complete, a Dashboard displays four main application menus: add transaction, history, menu list, and exit.
2) The Menu List page displays several available menus because the application is still developing. There is also an Add Transaction Page display containing a menu list, a basket icon in the top right corner of the screen, and page navigation buttons at the bottom.
3) There is the Add Menu List page display, which contains a form for adding a new menu to the application.
4) The Add Transaction Cart display displays a list of the menus ordered along with the quantity, with the total price to be paid and a "pay" button to save the transaction data made.

Figure 3. Splash Screen Display

Figure 4. Dashboard display

Figure 5. Dashboard display

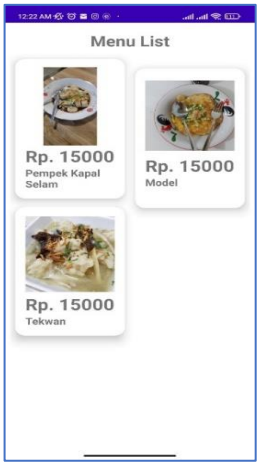

Figure 6. Menu List Display

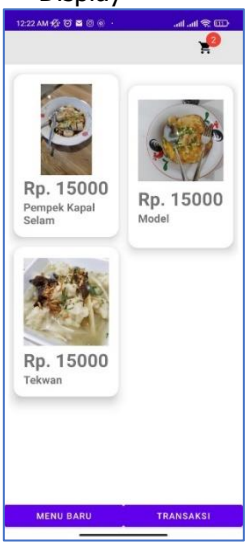

Figure 7. Add Transaction Display

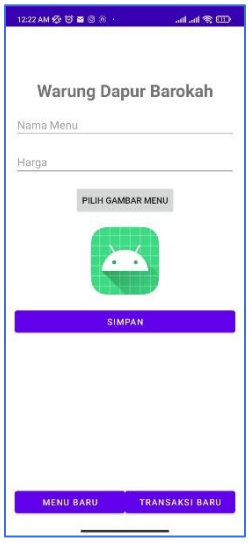

Figure 8. Add List Menu Display

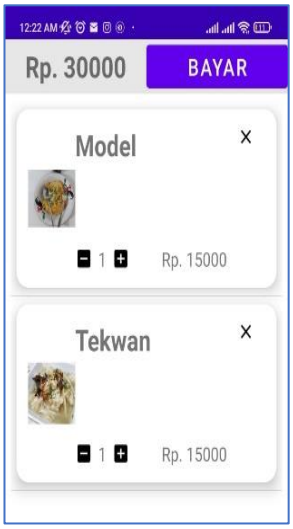

Figure 9. Add Transaction Cart Display

After making the application prototype in Android Studio, the next application testing phase is carried out on functions according to the expected goals using the black box testing method. Black box testing is a software testing method that focuses on the specifications of the tasks in the software being developed. In this testing, an internal understanding of the software structure or implementation is not required; What is tested is the input and output of a function or module without paying attention to how the internal processes are carried out. This approach is similar to treating software as a "black box" where only interactions between input and output are tested [11]. In general, in this test, various things can be identified, such as errors in functionality,

inappropriate data structures, problems in database access, interface errors, performance constraints, and errors in the initialization and termination processes [11].

Table 1. Application Testing Scenarios

No	Feature Name	Expected results	The results that occurred	Status
1	Add Transaction	Transactions can be loaded into the database.	Transaction results cannot be loaded into the database.	Fail
2	Add Menu	New menu lists can be loaded into the database	Menu lists can be loaded into the database.	Succeed
3	Displays the menu list	Displays a menu list containing the menu name, image and price.	Successfully displays the complete menu list.	Succeed
4	Transaction History	Displays the history of transactions that have been carried out	Unsuccessful displaying transaction list.	Fail

3.2 Discussion

Developing an Android-based point of sale (POS) application for Warung Dapur Barokah has highlighted several key considerations and challenges in transitioning from a manual to a digital transaction system. This section discusses the implications of the application's features, the outcomes of the initial testing, and the broader impact on the operational efficiency and profitability of the food stall. The application was designed to streamline the transaction process through user-friendly interfaces, including the Splash Screen, Dashboard, Menu List, Add Transaction, Add Menu List, and Transaction Cart. Each feature was developed with the end-user in mind, ensuring that even those with limited technical knowledge can navigate and utilize the application efficiently. The Dashboard is the central hub, providing quick access to all essential functions. The Add Transaction feature, in particular, is crucial as it allows for real-time input of sales data, instantly updated in the Firebase database, ensuring accuracy and reducing the likelihood of errors associated with manual entry. The application underwent black box testing to validate its functionality against the expected outcomes.

The tests revealed that while the Menu List and Add Menu functionalities were successful, there were issues with the Add Transaction feature and Transaction History display. Specifically, the transaction data failed to load into the database, and the transaction history was not displayed correctly. These issues suggest potential flaws in the database interaction logic or the application's ability to handle and store real-time data transactions. Addressing these issues will require a detailed examination of the database queries and data handling procedures and possibly optimizing the data synchronization processes with Firebase. Implementing this POS application is expected to enhance operational efficiency at Warung Dapur Barokah significantly. By automating the transaction process, the application reduces the time spent on manual data entry and minimizes errors in calculating and recording transactions. This shift improves the accuracy of sales records and provides real-time insights into sales performance, inventory levels, and financial metrics.

Consequently, the management can make informed decisions regarding inventory replenishment, promotional strategies, and overall business operations. Beyond operational efficiency, the POS application can potentially increase the profitability of Warung Dapur Barokah. With faster transaction processing, the food stall can handle more customers during peak hours, reducing wait times and improving customer satisfaction.

Additionally, accurate and up-to-date sales data enables better financial management, allowing for the identification of top-selling items and the adjustment of inventory and pricing strategies accordingly. Integrating a digital system also opens opportunities for loyalty programs, personalized marketing, and data-driven decision-making, which can increase revenue and customer retention. To fully realize the benefits of the POS application, addressing the current functional issues is imperative. Future development should focus on resolving the data synchronization problems, enhancing user experience, and incorporating additional features such as analytics dashboards, integration with payment gateways, and support for multiple user roles. Ensuring the application's scalability and reliability will be crucial for its long-term sustainability and adoption by other small businesses in the culinary sector. Developing and implementing the Android-based POS application for Warung Dapur Barokah represents a significant step towards modernizing its transaction processes. While initial testing has highlighted areas for improvement, the potential benefits of operational efficiency and profitability are substantial. Warung Dapur Barokah can achieve greater competitiveness and sustainability in the digital era by addressing the identified issues and continuing to enhance the application.

4. Related Work

Previous researchers have conducted several research results in the same field and topic as the research conducted. In 2022, research entitled Implementation of a Web-Based Cashier Application at the Ghafya Fruit Shop was conducted by Damar Eko Cahyono and Anisa Jayanti, discussing how to implement a web-based cashier application that can process information about fruit, employees, goods data, and even fruit shop sales transactions [12]. Another research entitled Portable Cashier Application Based on Android Point of Sale Integrated with Printers was conducted by Muhammad Sholeh, Estu Sinduningrum, and Astri Nindya Putri, discussing how to create an Android-based portable cashier application integrated with printers. This research method uses the waterfall method. The purpose of making this application is to simplify the transaction recap process [13]. The research entitled Android-Based Sidik Coffee Shop Cashier Management Information System Prototype was conducted by Nurdiana Handayani, Firdiansyah Firdaus, and Diki Ramadhan, discussing how to develop a cashier management information system prototype so that order management can be organized and effective. This research uses qualitative research methods with a case study in a coffee shop [14]. Another research entitled Design and Build an Android-Based Food Ordering Application created by Rudi Setiawan and Wahyu Nugroho, discusses creating an Android-based food ordering application. The research method for this application is the waterfall method. In making this application, the programming language used is Dart with the Flutter framework [15].

The development of point-of-sale (POS) applications has received significant attention in recent years, with many studies exploring various approaches and technologies to improve transaction processes and operational efficiency. This section reviews relevant literature to contextualize current research on Android-based POS applications for Warung Dapur Barokah. Damar Eko Cahyono and Anisa Jayanti (2022) researched implementing a web-based cashier application at the Ghafya fruit shop. This research focuses on implementing a web-based POS system capable of managing inventory, employee information, and sales transactions in a retail environment [12]. This application aims to simplify operations and increase data accuracy. However, this research highlights the challenges associated with internet connectivity and the need for robust network infrastructure, which can be a limiting factor in certain regions. Muhammad Sholeh, Estu Sinduningrum, and Astri Nindya Putri (2022) examined the development of a portable cashier application integrated with a printer in their research using the waterfall development method. He emphasized increasing transaction efficiency and portability, especially for mobile businesses such as food trucks and market stalls. Integration with printers facilitates fast receipt generation, thereby meeting practical operational needs [13]. However, ensuring reliable printer connectivity across devices was identified as a significant challenge.

Nurdiana Handayani, Firdiansyah Firdaus, and Diki Ramadhan (2021) developed a prototype of a cashier management information system for a coffee shop, which was described in their research. Prototype of an Android-based Sidik Coffee Shop Cashier Management Information System. This study uses qualitative research to highlight the importance of effective order management and transaction handling [14]. The case study approach provides insight into the specific needs of small-scale culinary businesses, showing how digital systems can improve order accuracy and customer satisfaction. Rudi Setiawan and Wahyu Nugroho (2021), in their research on the design and development of an Android-based food ordering application, used the waterfall method and the Dart programming language with the Flutter framework. This study focuses on creating a user-friendly interface for food ordering, which can be integrated into a wider POS system [15]. This research emphasizes the importance of a cohesive user experience and the potential for integrating ordering and payment processes to simplify operations. Mukhlasin (2018) study, Smartphone Selection Decision Support System Using the Web-Based Simple Additive Weighting (SAW) Method, provides insight into decision support systems that are relevant for improving POS applications [1]. Although focused on smartphone selection, the methodology and technology discussed in this research can be applied to optimize POS system functionality, particularly regarding user interface and decision-making processes. These studies collectively highlight various approaches to developing POS systems, each addressing specific operational needs and challenges. The latest research on an Android-based POS application for Warung Dapur Barokah builds on this foundation, focusing on the unique needs of a small food stall. By leveraging modern technologies such as Kotlin and Firebase, this research aims to provide a powerful, efficient, and user-friendly solution that increases operational efficiency and profitability in the culinary sector. The methodology and findings from related research provide valuable guidance for developing and refining the proposed application, ensuring it meets the practical needs of its users while incorporating the latest advances in POS technology. As shown by previous research, the integration of POS systems in various business contexts underscores the transformative potential of digital solutions in simplifying operations and increasing accuracy. The Android-based Warung Dapur Barokah POS application's development is expected to significantly contribute to existing

knowledge, offering insights and practical solutions that can be adapted and applied in similar small business environments in the culinary sector.

5. Conclusion

This research proposes and designs an Android-based cashier application for Warung Dapur Barokah in Pangkalpinang. This shop still uses a manual cashier system, which is prone to errors and slow in the transaction process. This application was developed to increase efficiency, speed, and accuracy in managing transactions. Using Android Studio, the Kotlin programming language, and the Firebase database, this application is expected to provide an effective solution to overcome obstacles in the manual transaction process. Analysis of the current system shows that transaction management at the shop is still done manually, which takes a long time and is prone to errors. Therefore, a cashier application is proposed to overcome this problem. The functions required by the application include storing menu and transaction data and calculating total transactions. The proposed system design uses Firebase as a database to store transaction data and food menus. This research also considers selecting appropriate software and hardware, including using Android as an operating system, Android Studio as an IDE, Firebase as a database, and the Kotlin programming language. Application testing is carried out using the black box testing method to ensure the application functions run as expected. A literature review shows that several previous studies have also developed Android-based cashier applications for various purposes, such as fruit shops, coffee shops, and food ordering. This research is another contribution to creating an Android-based cashier application focusing on food stalls. Thus, it is hoped that this cashier application can positively contribute to increasing the operational efficiency of Warung Dapur Barokah and creating effective solutions to improve the competitiveness and sustainability of local businesses in the culinary sector.

References

[1] Mukhlasin, A. (2018). Sistem Pendukung Keputusan Pemilihan Smartphone Menggunakan Metode Simple Additive Weighting (SAW) Berbasis Web. *Prosiding SISFOTEK*, 2(1), 46–52. https://www.seminar.iaii.or.id/index.php/SISFOTEK/article/view/55

[2] Hariyanti, I., & Wiguna, W. (2019). Perbandingan Metode Weighted Product dengan Simple Additive Weighting untuk Evaluasi Kinerja Kasir. *Jurnal Responsif: Riset Sains dan Informatika*, 1(1), 33–45. https://doi.org/10.51977/JTI.V1I1.63

[3] Juansyah, A. (2015). PEMBANGUNAN APLIKASI CHILD TRACKER BERBASIS ASSISTED-GLOBAL POSITIONING SYSTEM (A-GPS) DENGAN PLATFORM ANDROID. *Jurnal Ilmiah Komputer dan Informatika (KOMPUTA)*, 1(1), 1–8.

[4] Wijaya, I., & Firmansyah, D. (2018). PERANCANGAN DAN PEMBUATAN MEDIA PEMBELAJARAN BERBASIS ANDROID MATA PELAJARAN TEKNOLOGI PERKANTORAN (STUDI KASUS KELAS X OTPS MK NEGERI 3 PADANG). *Jurnal Pendidikan Teknologi Informasi*, 5(2), 9–20. http://lppm.upiyptk.ac.id/ojs3/index.php/

[5] Nasution, A., Efendi, B., & Siregar, I. K. (2019). PELATIHAN MEMBUAT APLIKASI ANDROID DENGAN ANDROID STUDIO PADA SMP NEGERI 1 TINGGI RAJA. *Jurdimas (Jurnal Pengabdian Kepada Masyarakat) Royal*, 2(1), 53–58. https://doi.org/10.33330/JURDIMAS.V2I1.321

[6] Putra, B. P., & Aliyah, S. (2023). Implementasi Layanan Penyedia Jasa Tukang Kebun Berbasis Android. *Jurnal Ilmiah Teknik Informatika dan Komunikasi*, 3(1), 19–31. https://doi.org/10.55606/JUITIK.V3I1.371

[7] Pratama, R. Y., & Somya, R. (2021). Perancangan Aplikasi Point Of Sales (POS) Berbasis Android (Studi Kasus: Warkop Vape Salatiga). Retrieved from http://jurnal.mdp.ac.id.

[8] Khawas, C., & Shah, P. (2018). Application of Firebase in Android App Development-A Study. *International Journal of Computer Applications*, 179(46), 975–8887. https://doi.org/10.5120/ijca2018917200

[9] Sibarani, N. S., Munawar, G., & Wisnuadhi, B. (n.d.). Analisis Performa Aplikasi Android Pada Bahasa Pemrograman Java dan Kotlin.

[10] Hendini, A. (2016). PEMODELAN UML SISTEM INFORMASI MONITORING PENJUALAN DAN STOK BARANG (STUDI KASUS: DISTRO ZHEZHA PONTIANAK). *Jurnal Khatulistiwa Informatika*, 4(2). https://doi.org/10.31294/JKI.V4I2.1262

[11] Rahadi, N. W., & Vikasari, C. (2020). Pengujian Software Aplikasi Perawatan Barang Milik Negara Menggunakan Metode Black Box Testing Equivalence Partitions. *Infotekmesin*, 11(1), 57–61. https://doi.org/10.35970/INFOTEKMESIN.V11I1.124

[12] Cahyono, D. E., & Jayanti, A. (2022). IMPLEMENTASI APLIKASI KASIR BERBASIS WEB PADA TOKO GHAFYA FRUITS SHOP. *JURNAL EKONOMI DAN TEKNIK INFORMATIKA*, 10(1), 32–40. https://doi.org/10.37601/JNETI.V10I1.184

[13] Sholeh, M., Sinduningrum, E., & Putri, A. N. (2022). Aplikasi Kasir Portabel Berbasis Android Point of Sale Terintegrasi dengan Pencetak. *InfoTekJar: Jurnal Nasional Informatika dan Teknologi Jaringan*, 6(2), 228–236. https://doi.org/10.30743/INFOTEKJAR.V6I2.4436

[14] Handayani, N., Firdaus, F., & Ramadhan, D. (2021). PROTOTYPE SISTEM INFORMASI MANAJEMEN KASIR KEDAI KOPI SIDIK BERBASIS ANDROID. *Journal of Information Technology*, 6(1).

[15] Setiawan, R., & Nugroho, W. (2021). Rancang Bangun Aplikasi Pemesanan Makanan Berbasis Android. *Journal of Information Systems and Informatics*, 3(2), 329–340. https://doi.org/10.33557/journalisi.v3i2.132.

