

Advancing Business Services Through Web and Mobile Application Development

Ahlul Aziz Ancala Putra ¹, Sri Wulandari ²

^{1,2} Informatics Study Program, Faculty of Science & Technology, University of Technology Yogyakarta, Indonesia
Email: ahlul.5200411441@student.uty.ac.id, sri.wulandari@staff.uty.ac.id

Abstract—Cafés are commercial establishments that serve food and drinks to customers in a casual setting. They also provide a conducive environment for relaxation and socializing with relatives. However, the operational processes of many cafés in Yogyakarta, including the Konogawa Coffee & Culture, still rely on manual methods, resulting in long queues and extended waiting times when multiple customers arrive simultaneously. To address these challenges and enhance service performance, a system comprising a mobile application and an interconnected website has been developed. The website serves as a promotional medium, providing information about the café, while the mobile application enables customers to conveniently place menu orders online. The system design incorporates API technology to establish seamless connectivity between the website and the mobile application. When a customer uses their mobile device connected to the local area network to place an order, the ordering information is promptly transmitted to the cashier, who then forwards it to the kitchen. By improving the delivery of order information, this system enhances service performance and reduces customer wait times.

Index Terms— API, Café, Mobile Application, Website.

Abstrak—Kafe adalah tempat komersial yang menyajikan makanan dan minuman kepada pelanggan dalam suasana santai. Kafe juga merupakan tempat yang tepat untuk bersantai dan bertemu kerabat. Dalam proses operasionalnya, banyak kafe di Yogyakarta yang salah satunya adalah kafe Konogawa, menggunakan proses manual. Hal tersebut dapat menyebabkan antrean panjang ketika banyak pelanggan datang dalam waktu yang bersamaan sehingga beberapa pelanggan harus menunggu lebih lama untuk melakukan proses pemesanan. Berdasarkan permasalahan tersebut dibuatlah sebuah sistem berupa aplikasi mobile dan website yang saling berhubungan untuk dapat meningkatkan kinerja pelayanan kafe. Website berfungsi sebagai media promosi dan berisikan informasi mengenai kafe, sedangkan aplikasi mobile dapat digunakan untuk melakukan pemesanan menu secara online. Dalam merancang sistem, penulis menggunakan teknologi API untuk menghubungkan situs web dengan aplikasi mobile. Proses ini bekerja ketika ada pelanggan melakukan pemesanan menu menggunakan ponselnya yang terhubung ke jaringan area lokal. Informasi pemesanan tersebut akan dikirim ke bagian kasir yang selanjutnya akan diteruskan ke bagian dapur. Hasil dari dibuatnya sistem ini akan membantu meningkatkan kinerja pelayanan kepada pelanggan dengan mempercepat pengiriman informasi pesanan ke bagian dapur.

Kata Kunci—API, Aplikasi Mobile, Kafe, Website.

I. INTRODUCTION

A café represents a commercial establishment that provides a wide array of culinary offerings and beverages within a laid-back and inviting setting, distinct from the formal protocols typically associated with upscale dining venues. These venues serve as ideal destinations for patrons seeking leisure, relaxation, and opportunities for familial and social connections. Given the uprising numbers of cafés, café owners must engage in innovative thinking to craft novel and distinctive concepts to distinguish themselves in a competitive landscape. In this dynamic environment, customers are increasingly drawn to cafés that offer unique and unparalleled experiences.

In the course of its history, Yogyakarta has witnessed a proliferation of cafés, among which stands Konogawa Coffee & Culture, founded on September 26, 2020, at Jl. Jati Mataram No. 277, Sleman, Yogyakarta. Konogawa offers a diverse selection of culinary delicacies and beverages, each meticulously crafted to meet the unique preferences of its patrons. The café boasts a thoughtfully curated ambiance, infusing elements of Japanese culture into its interior design, evoking the aesthetics found in Japanese buildings. Equipped with complimentary Wi-Fi access and an array of captivating photo opportunities, this establishment not only appeals to visitors but also encourages extended visits, creating an ambiance akin to a home.

Currently, Konogawa employs a manual service system wherein patrons must approach the cashier to place their orders. This manual approach, while personable, carries the inherent risk of prolonged queues during peak periods when a substantial influx of customers occurs. This circumstance may lead to inconveniences for patrons who may experience extended wait times to initiate their menu selections.

Based on the problems that have been mentioned beforehand, it is imperative for the journal authors to consider the development of a website and a mobile application, employing the API technology, to enhance the operational efficiency of Konogawa. Websites serve as a vital means for product and service presentation to the ever-growing online audience, concurrently serving as powerful promotional tools for the café. As such, the website should possess a visually appealing and dynamic design to capture the interest of potential patrons. In today's digital landscape, the integration of APIs within websites has become a common practice, enabling seamless connectivity between various services offered by an establishment. APIs facilitate data transfer in a structured JSON format, which can be effortlessly received and interpreted by API clients, most commonly in the form of mobile applications [1].

II. METHOD

The design and development of the system in this study adheres to the waterfall model methodology, which is recognized for its systematic and sequential approach to software development. It is characterized by a well-defined series of phases that must be completed in a specific order [2]. The key phases of the waterfall methodology encompass the following stages:

A. Requirement Analysis

In this initial phase, the project team collaboratively gathers and meticulously analyzes system requirements, ensuring a comprehensive understanding of client expectations and needs.

B. System Design

After the requirement analysis, the system design phase unfolds, where a detailed blueprint is crafted, describing the architectural and functional components to be seamlessly integrated into the system.

C. Implementation

The implementation phase, often referred to as the coding phase, follows the system design. It is in this stage that the actual development work takes place, translating the design into a functional system.

D. Testing

Upon the conclusion of the implementation phase, rigorous testing commences. The testing phase is dedicated to identifying and rectifying any potential system defects, ensuring a robust and bug-free final product.

E. Deployment

After successfully passing through the testing phase, the system progresses to the deployment stage, where it is introduced to the intended user base or marketplace, marking the transition from development to practical utilization.

F. Maintenance

This stage is instated for addressing system-related concerns, including client complaints or routine maintenance tasks. Its principal objective is to uphold the system's reliability and performance, ensuring it functions optimally over time.

III. RESULTS AND DISCUSSION

A. System Planning

The process of developing this system initiates with meticulous system planning, where project goals and objectives are defined, and the overall project scope is outlined. Thus, the project moves into defining the functional requirements, which encompass three core components: input, process, and output requirements. Input requirements specify how data and information are collected and entered the system. Process requirements set out the core functionalities, algorithms, and operations the system must perform. Output requirements detail how the system presents information to users or other systems. Once the functional requirements are thoroughly defined, attention shifts to the nonfunctional requirements. These

nonfunctional requirements encompass the technical and performance aspects of the system. In addition to technical specifications, nonfunctional requirements may also include system requirements necessary for running the application effectively, such as specific hardware or software dependencies [3].

- Functional Requirements
 - Input requirements.
 - The contact us section of the website allows for the submission of messages, including criticism, and suggestions.
 - Within the website's admin panel section, data relevant to the café such as products, categories, news, user accounts, and admin accounts can be entered.
 - User account data can be entered within the mobile application.
 - The mobile application provides the capability to input data for placing menu orders.
 - Process requirements.
 - The website can execute the authentication process for café employee accounts.
 - The website can manage message data (including criticism, and suggestions) from the contact us section, storing it in a database for later display in the admin panel.
 - The admin panel section of the website is equipped to manage the results of data input performed by café employees.
 - The mobile application is responsible for executing the user account authentication process.
 - The mobile application has the capacity to process user order data and transmit this information to the website.
 - The admin panel section of the website can manage the order data generated by users using the mobile application.
 - Output requirements.
 - The website can present a wide array of café information, encompassing café descriptions, products, news, location details, and contact information.
 - Within the website's admin panel section, the outcomes of data input by café employees can be showcased.
 - The admin panel section of the website is equipped to exhibit customer order data generated through the mobile application.
 - Mobile applications have the capacity to showcase user account data.
 - The mobile application can provide visibility to the range of café products currently available.

- *Nonfunctional Requirements*
- Software requirements.
 - Google Chrome
 - Firefox
 - Opera
 - Safari
 - Microsoft Edge
- Hardware requirements.

TABLE I.
MINIMUM COMPUTER REQUIREMENTS

No	Hardware	Specifications
1	Processor	Intel Celeron 1GHz or AMD Duron 2.0GHz
2	GPU	AMD Radeon Xpress 1200 Series or NVIDIA GeForce FX 5200
3	RAM	4 GB
4	Storage	125 GB

TABLE II.
MINIMUM PHONE REQUIREMENTS

No	Hardware	Specifications
1	Processor	Helio G37 or any equivalent
2	RAM	4 GB
3	Internal Memory	64 GB

B. System Design

In the system design phase, the comprehensive blueprint of the system takes shape, encompassing the architecture and functionality that will address the system's requirements. This stage plays a pivotal role in shaping the system's structure, defining how data flows, and ensuring the system can efficiently achieve its intended purpose. System designers meticulously detail the system's components, and operational workflows, as shown in Figure 1.

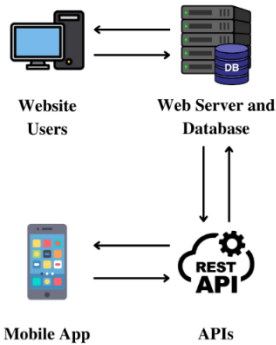


Fig. 1. System's Architecture Components

As part of the design process, two essential components, the Use Case and Entity-Relationship Diagram (ERD), come into focus. The Use Case diagram provides a visual representation of how users interact with the system, outlining various scenarios and the corresponding actions the system performs in response [4], with separate diagrams for the website in Figure 2 and mobile application in Figure 3. On the other hand, the ERD offers a visual depiction of the system's data structure and the relationships between different data

elements, aiding in data modeling and database design [5], as shown in Figure 4.

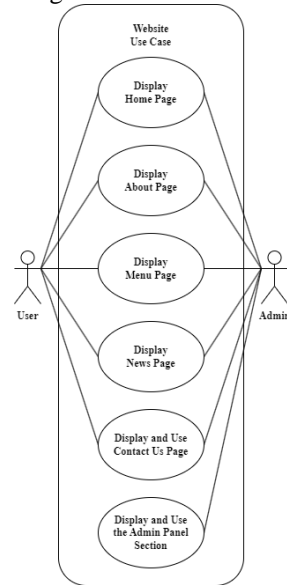


Fig. 2. Use Case Diagram for the Website

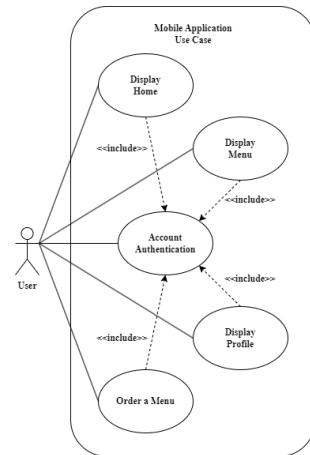


Fig. 3. Use Case Diagram for the Mobile Application

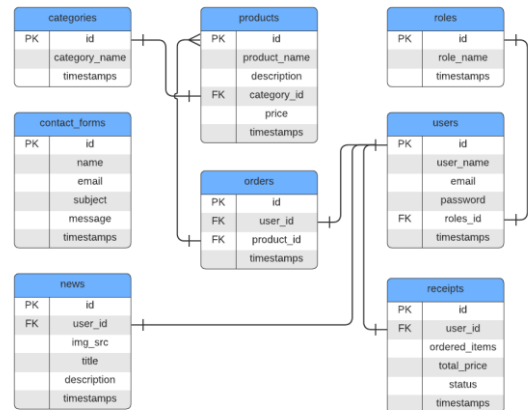


Fig. 4. Entity-Relationship Diagram (ERD) for the System

C. System Implementation

As we progress into the system implementation phase, the design and planning laid out earlier now come to life. The authors begin the coding and construction of the system, transforming the conceptual blueprint into a functional reality. In this phase, attention is directed towards both the website and mobile components of the system.

1) Website
a. Landing Page

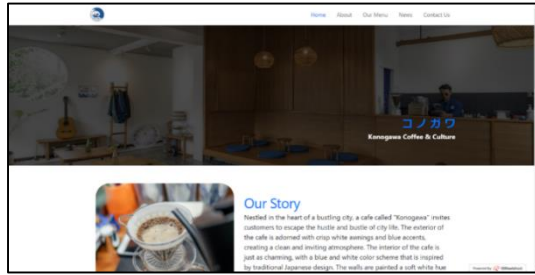


Fig. 5. Website Landing Page

The landing page serves as the primary entry point for website users, offering a concise introduction to the content available on other pages.

b. About Page

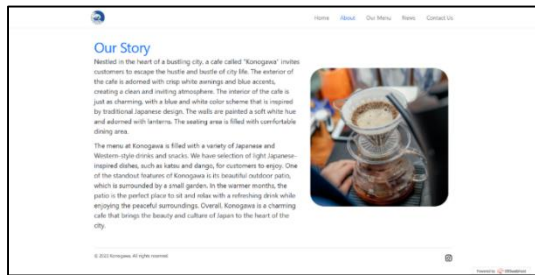


Fig. 6. About Page on the Website

The 'About' section encompasses a concise description that provides insights into the café's background and theme selection.

c. Our Menu Page

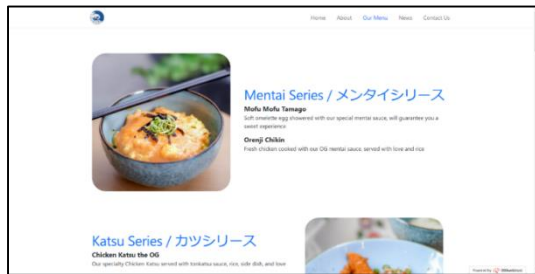


Fig. 7. Our Menu Page on the Website

The 'Our Menu' section is a visual banquet that offers a delightful and comprehensive selection of products thoughtfully curated and proudly presented by the café.

d. News Page

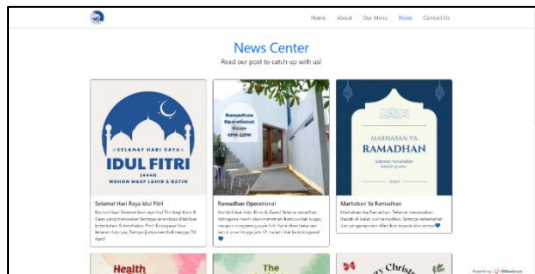


Fig. 8. News Page on the Website

The 'News' section houses the most up-to-date information concerning café-related events and activities.

e. Contact Us Page

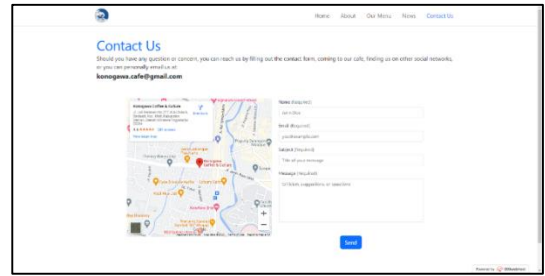


Fig. 9. Contact Us Page on the Website

The 'Contact Us' section offers comprehensive details regarding the café's location and contact information, providing readily accessible means of communication.

f. Login Page

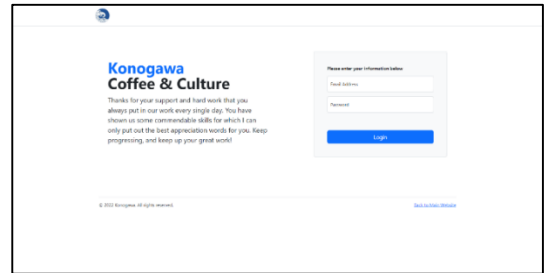


Fig. 10. Login Page on the Website

The 'Login' page section is purposefully crafted to streamline the authentication process for café employees seeking access to the admin panel.

2. Admin Panel

a. Manage Orders Page

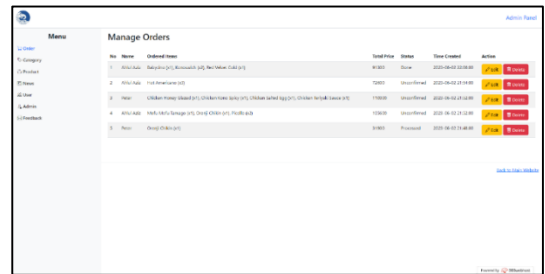


Fig. 11. Manage Orders Page on the Website within the Admin Panel

This section is tailored for café employees, enabling them to access, modify, and remove customer order data within the café's system.

b. Manage Categories Page

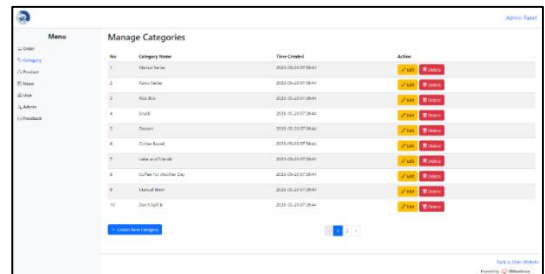


Fig. 12. Manage Categories Page on the Website within the Admin Panel

This section is custom-tailored for café employees, granting them the ability to view, add, modify, and delete data related to café product categories.

c. *Manage Products Page*

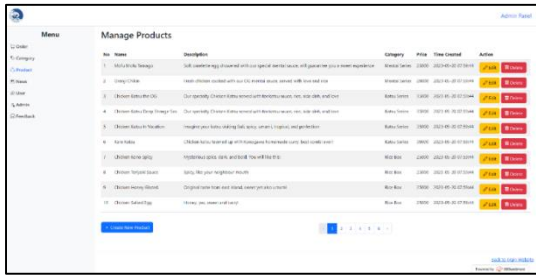


Fig. 13. Manage Products Page on the Website within the Admin Panel

This section is purpose-built for café employees, granting them the capability to access, add, modify, and remove data pertaining to café products.

d. *Manage News Page*

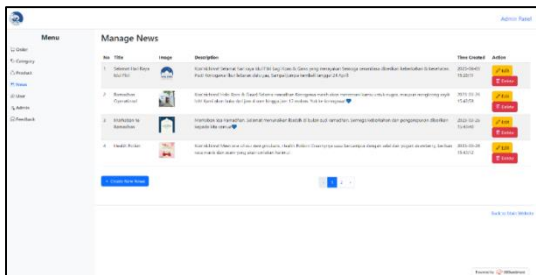


Fig. 14. Manage News Page on the Website within the Admin Panel

This section is uniquely crafted for café employees, providing them the capacity to access, add, edit, and remove café news from the main website on the news page.

e. *Manage User Accounts Page*

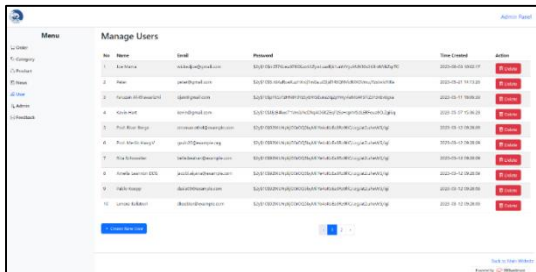


Fig. 15. Manage User Accounts Page on the Website within the Admin Panel

This section is purpose-built for café employees, allowing them to access, add, and remove user account data for the mobile application.

f. *Manage Admin Accounts Page*

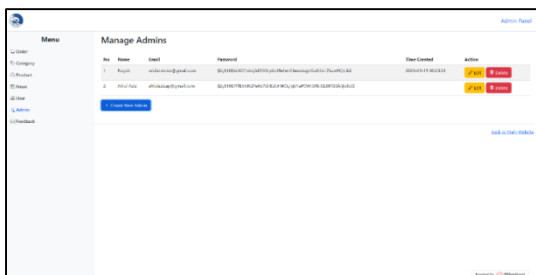


Fig. 16. Manage Admin Accounts Page on the Website within the Admin Panel

This section is custom-tailored for café employees, providing them with the ability to access, add, modify, and remove café employee account data.

g. *Manage Feedback Page*

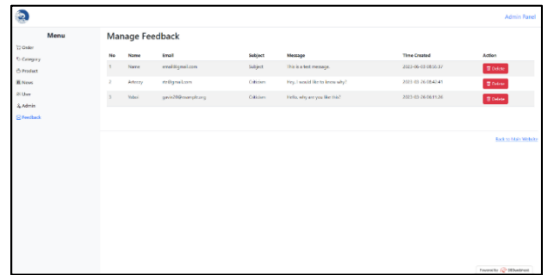


Fig. 17. Manage Feedback Page on the Website within the Admin Panel

This section is exclusively created for café employees, granting them the capability to review and remove message data in the form of customer feedback, including criticism, and suggestions.

3. *Mobile Application*

a. *Information Screen*

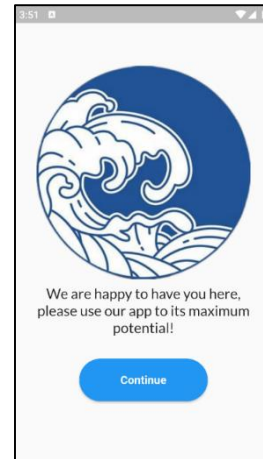


Fig. 18. Information Screen on the Mobile Application

The information screen prominently features the café's logo, complemented by motivational messaging aimed at inspiring users to maximize their experience with the application. Additionally, a button is provided to guide first-time users to the login screen.

b. *Login Screen*

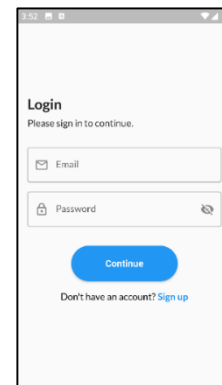


Fig. 19. Login Screen on the Mobile Application

The login screen is custom-tailored to streamline the process of authenticating user accounts. Through this

page, users can input their account details, confirming their identity, and enabling access to app-specific functionalities.

c. Register Screen

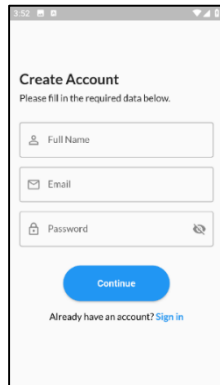


Fig. 20. Register Screen on the Mobile Application

This screen serves as an alternative to the login procedure for users without existing accounts, enabling them to utilize the application and authenticate their accounts.

d. Home Screen

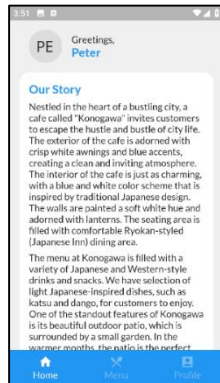


Fig. 21. Home Screen on the Mobile Application

This screen presents information from previously verified users, including their profile photo and name. Furthermore, it offers essential details regarding the café, such as a concise café description, its location, operating hours, and contact number.

e. Menu Screen

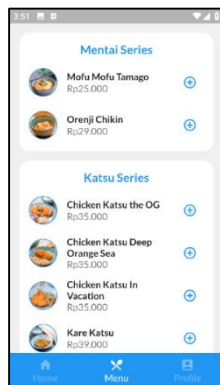


Fig. 22. Menu Screen on the Mobile Application

The menu presentation is strategically crafted to enhance the convenience of café application users, enabling them to effortlessly peruse the café's menu,

select their preferred items, and complete their online order.

f. Cart Screen

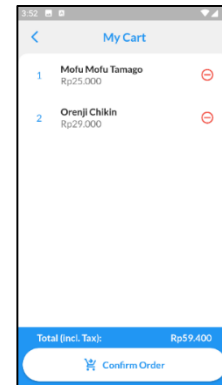


Fig. 23. Cart Screen on the Mobile Application

This screen caters to users interested in reviewing and removing products kept for future orders. Users can access a list of items in their cart or order list, and they have the option to remove specific products from their selection.

g. Summary Screen



Fig. 24. Summary Screen on the Mobile Application

This interface is tailored for users who have completed the menu ordering process. It showcases user order details, presenting a list of selected menu items along with their respective quantities. Furthermore, it offers guidance for users to finalize their orders at the cashier.

h. Profile Screen



Fig. 25. Profile Screen on the Mobile Application

This interface is designed for users seeking to access, modify their account information, and initiate the logout process.

i. Change Password Screen

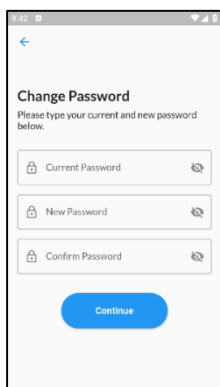


Fig. 26. Change Password Screen on the Mobile Application

This view is dedicated to users who wish to modify the password associated with their individual user accounts. In cases of unexpected events or security concerns, users can utilize this interface to refresh their password with a new one, thereby reinforcing the security of their accounts and safeguarding against unauthorized access or misuse.

4. System Testing

After the completion of the implementation phase, rigorous system testing becomes a pivotal step to ensure the software's functionality and reliability. In this context, the black box testing approach is employed, focusing on evaluating the system's external behavior and interactions without specific knowledge of its internal code structure. Black-box testing examines the software by subjecting it to various input scenarios, assessing how the system responds, and verifying whether it adheres to the specified requirements.

TABLE III.
WEBSITE BLACK BOX TESTING

No	Test Case	Expected Result	Actual Result	Validity
1	Hosting	Websites could be accessed online using their respective networks	The website can be accessed online using different devices with their own network's connection	Valid
2	Navigation	Navigation bar that could be used to navigate through the website	Navigation bar enabled the user to navigate through each page on the website	Valid
3	Button	All buttons within the website should function correctly as how it was planned	All buttons within the website works exactly as how it was planned	Valid
4	Image	All images should display itself with no errors whatsoever	All images render themselves correctly and as fast as the	Valid

5	Content	The website should contain content designed by café employees themselves	user's internet connection The website displays its content dynamically from the database	Valid
---	---------	--	--	-------

TABLE IV.
ADMIN PANEL BLACK BOX TESTING

No	Test Case	Expected Result	Actual Result	Validity
1	Hosting	The admin panel could be accessed by the café employees online using their respective networks	The admin panel can be accessed online by the café employees using different devices with their own network's connection	Valid
2	Database	The database should contain a collection of data obtained during the data collection process	The data stored in the database is the outcome of the data collection process and can be accessed by the café employees using the admin panel pages	Valid
3	Table	The table view should be populated with data that corresponds to the information in the database	All the table within the admin panel is filled with data from the database and can be modified by the café employees	Valid
4	Buttons	All buttons within the admin panel should work exactly as how it was planned	All buttons within the admin panel works as expected, thus the café employee can modify the data within the table	Valid

TABLE V.
MOBILE APPLICATION BLACK BOX TESTING

No	Test Case	Expected Result	Actual Result	Validity
1	Information Screen	Should function as the first screen and plays a role in verifying the user's authentication status	Logged-in users are seamlessly directed to the home page without being routed to the login page and vice versa	Valid

2	Login Screen	Should be able to verify the user's account information	Able to verify which account is in the database and the one that's non-existent	Valid		display user accounts, modify account details such as password, and initiate the logout procedure	information, including their profile image and name, along with a logout button for signing out	
3	Register Screen	Should serve and guide the first timer of the mobile application to make a new account	Able to verify user's information and provide some assistant if said user's information is already exist inside the database	Valid	9	Change Password Screen	Facilitates the process of updating password information while validating user input for each alteration	Valid
4	Home Screen	Should be able display logged-in user's data	Displays the logged-in user's data such as their profile image, and their name	Valid				
5	Menu Screen	Should be able to present the café's offerings and enable users to initiate the menu ordering process without intermediaries	Efficiently showcased the café's product offerings and facilitating direct orders through the application	Valid				
6	Cart Screen	Should be able to render a list of products that has been manually added by the user	Displays a list of products that has been manually added by the user, that is currently about to order with through the application	Valid				
7	Summary Screen	Should be able to display a summary of user's order which include each item with their respective quantities	Display a summary of user's order data which has each ordered item with each own respective quantities and the total cost of the order	Valid				
8	Profile Screen	Should be able to	Displays the user's account	Valid				

IV. CONCLUSION

In summary, the author has successfully created both the website and mobile application as versatile tools that transcend their core functions. These platforms not only offer user-friendly experiences but have also proven to be powerful promotional mediums for the café. Notably, the efficient usage of the API has enabled the mobile application to work seamlessly with the web server and database, enhancing overall operational efficiency and data exchange. This strategic implementation reflects the author's commitment to improving the café's services and its ability to engage with a broader audience.

ACKNOWLEDGMENT

The authors of this manuscript would like to express thanks to Konogawa Coffee & Culture staff and team for enabling us to conduct this research by providing relevant information.

REFERENCES

- [1] J. Ofoeda, R. Boateng, and J. Effah, "Application programming interface (API) research: A review of the past to inform the future," *International Journal of Enterprise Information Systems (IJEIS)*, vol. 15, no. 3, pp. 76–95, 2019.
- [2] R. B. Hadiprakoso, *Rekayasa Perangkat Lunak*. Rbh, 2020.
- [3] B. Singh, "Software Engineering: Classification of Requirements".
- [4] A. Y. Aleryani, "Comparative study between data flow diagram and use case diagram," *International Journal of Scientific and Research Publications*, vol. 6, no. 3, pp. 124–126, 2016.
- [5] Z. F. Azzahra and A. D. Anggoro, "Analisis Teknik Entity-Relationship Diagram dalam Perancangan Database Sebuah Literature Review," *INTECH (Informatika dan Teknologi)*, vol. 3, no. 1, pp. 8–11, 2022.