



Implementation of Rapid Application Development (RAD) Method for Mobile-Based Ice Cream Ordering Application

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Abstract

Mobile technology has changed the way consumers interact with service and product providers. One of the impacts is the increasing need for online ordering services that offer comfort and convenience. However, many businesses have not utilized mobile technology optimally. This research aims to develop an Android mobile-based ice cream ordering application with a case study on Pak Wagiman's Ice Cream business. There are challenges faced by ice cream businesses, including intense competition, fluctuating demand, accessibility needs, order recording errors, and limited technology adoption. The application development method used is Rapid Application Development (RAD), with stages: needs analysis, system design (use case diagram, class diagram and interface), application development using Kotlin on Android Studio, and MySQL database, and the last stage is black box testing and feasibility testing by users and implementation. Data collection was carried out through a questionnaire to 120 customers using a Likert scale. The results of blackbox testing show that the application's functionality runs perfectly (100%), while the feasibility test gives a score of 95.6% (very feasible). The application proved effective in optimizing business processes, and further development is recommended to add a live chat feature to improve direct interaction with customers.

Keyword: Android, Ice Cream Ordering, Mobile Application, Rapid Application Development (RAD)

1. INTRODUCTION

In the ever-evolving digital era, mobile technology has changed many aspects of life, including the way consumers interact with service and product providers [1], [2]. In the food and beverage industry, especially in the ice cream sales business, online ordering is increasingly becoming a necessity to increase customer convenience [3], [4]. There are challenges faced by this industry, such as the large number of competitors operating in the same area and limitations in effective consumerization [5]. In addition, consumer demand for fresh and high-quality ice cream continues to increase, but the accessibility and ease of ordering ice cream is still a challenge [6]. In addition, many small to medium-sized businesses have not fully utilized technology [7]. Most still rely on conventional methods, such as ordering by phone or instant messaging applications, which often cause errors and delays in order delivery [8], [9]. These inefficiencies can reduce customer satisfaction and even lead to lost business opportunities [10].

Prior studies on ordering applications include research [11] which used grounded methodologies and the Java programming language to build desktop-based applications for ordering food and drinks at d'bestO fast food restaurants. Next, research [12] created an application information system for online restaurant food ordering. According to the study's findings, which were derived using the Agile Development Method, 87% of consumers are satisfied with online meal ordering services. In order to improve convenience and the efficiency of Angkringan Kanca's services, researcher [13] used Agile Development approach to design a mobile web-based ordering application. According to earlier studies, no study has been done on creating mobile applications for ice cream ordering.

Therefore, there is a need to develop a mobile-based ordering application that is more structured, efficient, and able to better answer user needs [14], [15]. A well-designed application can reduce the risk of ordering errors, speed up the transaction process, and make it easier for customers to track the status of their orders [16], [17]. In addition, with the increasing public preference for digital transactions, an ordering application that is integrated with various electronic payment methods is also very relevant [18], [19]. In mobile application development, the Rapid Application Development (RAD) method is often considered the right

choice [20]. RAD offers a flexible and iterative approach, allowing developers to quickly produce prototypes of applications as well as receive feedback from users throughout the development process [21]. In the context of developing an Android-based ice cream ordering application, this method is considered capable of providing efficient and fast solutions according to dynamic market needs. Previous research by [22], [23], [24], [25], [26], [27], [28] has shown that the RAD method is effective in reducing development time and allowing for customization. Other research that applies mobile applications for online ordering states that using mobile applications can facilitate the transaction process in the business [29], [30]. While previous research has shown that RAD methods are effective in speeding up the application development cycle, many of these applications do not focus on usability evaluation in the context of ordering seasonal or impulse purchase products, such as ice cream. This research gap points to the need for implementation studies of RAD methods that not only prioritize speed of development, but also specifically measure and improve usability aspects to enhance user experience. This research uses a payment gateway for payments with a variety of payment methods that can facilitate customers.

This research aims to develop an Android mobile-based ice cream ordering application using the Rapid Application Development method. This research takes a case study on Mr. Wagiman's Ice Cream business. Researchers chose Pak Wagiman's ice cream business because Pak Wagiman's ice cream business still uses conventional methods in order management which has problems in recording order errors and order delays which cause a decrease in customer satisfaction. The main objective of the research is to produce an application that not only simplifies the ordering process for customers, but also increases operational efficiency for ice cream businesses. This application is expected to provide relevant features such as menu options, integration with digital payment methods with payment gateways, and real-time delivery tracking. The benefits of this research are expected to include improving the customer experience in placing orders, helping businesses maximize operational efficiency and accuracy, and contributing to the development of mobile-based application technology. This research is also expected to provide new insights for application developers regarding the effectiveness of the RAD method in developing user-oriented mobile applications.

2. LITERATURE REVIEW

This research has conducted a literature review of previous research on ordering applications, among others, research [11] which uses grounded methodology and Java programming language to build desktop-based applications for ordering food and drinks at d'bestO fast food restaurants, the payment methods offered are cash and QRIS payments. Furthermore, research [12] created a website-based online restaurant food ordering information system application with the Agile Development method. This application is only used by employees to record orders. The results of the study, the level of customer satisfaction was 87%. Then the researcher [13] used the Agile Development approach to design an ordering application at Angkringan Kanca based on mobile web. Furthermore, research by [25], who made an android-based culinary menu ordering application, where customers come to the restaurant and order a menu through the application, and customers can make payments using a QR Code or cash.

Based on previous research, the similarities with this research are in terms of developing food or beverage ordering applications, but the difference with previous research in this study is that buyers do not have to come to the ice cream shop, customers can place orders anywhere and anytime through the application, and this application is integrated with a payment gateway that offers various payment methods, namely e-wallets, credit / debit cards, and payment through minimarkets.

3. MATERIALS AND METHOD

3.1 Data Collection Methods

Data collection conducted by researchers will take approximately 2 months. Researchers conducted observations and interviews with ice cream business owner Mr. Wagiman and interviews with his customers, this was done to observe the process of ordering ice cream. Researchers also collected 120 respondents for app feasibility testing. Respondents are Mr. Wagiman's ice cream customers. The data collected is used for the process of analyzing user and system user needs. Researchers also conducted literature studies through books and journal articles relevant to this research.

3.2 System Development Methods

The research method in this study is to analyze problems and analyze system requirements. the model used by researchers is Rapid Application Development (RAD). The nature of this model is incremental, this model is suitable for short processing time. The RAD model is a process of design, and development in incremental techniques. RAD focuses on speed in system development to meet the needs of users or system owners such as prototyping but has a broad scope [31]. Figure 1 is a RAD model used in building ice cream ordering applications.

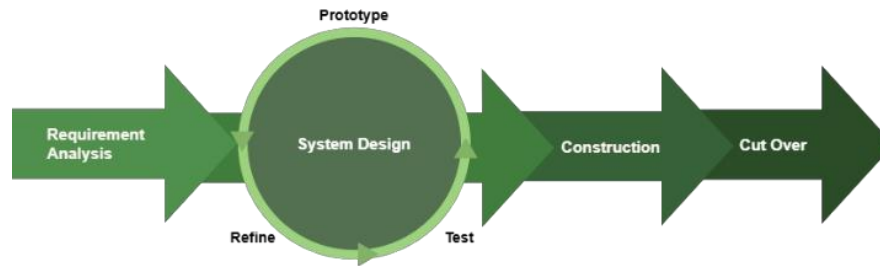


Figure 1. RAD Model

Based on the RAD model in Figure 1, there are stages of system development carried out, starting from requirement analysis which is carried out to analyze business problems so as to produce output in the form of results of analyzing user needs and system requirements, then continued by the system design process which has a prototype, refine and test process cycle where developers create initial prototypes, collect feedback to refine the design, and then conduct tests to ensure the system functions according to user needs. After the system design process is carried out, the construction process continues by coding using a programming language. The final stage of the RAD model is cut over or the application testing stage which is carried out to ensure the system functions properly, using the Blackbox method and test tables with various criteria before the application can be used [32].

4. RESULTS AND DISCUSSION

4.4 Requirement Planning

The implementation of the RAD method in system development begins with requirement planning which aims to understand user needs and system needs. This stage includes analyzing functional requirements and analyzing non-functional requirements. Users who use this ice cream ordering application are admins and customers. The following is a detailed analysis of the needs of the system:

1. Functional Requirement Analysis

Functional requirements describe what the system should do, including inputs, processes, and outputs. Input requirements include an Android device to manage ice cream orders. Process requirements include user registration, ice cream selection, payment method, order confirmation, and delivery, followed by user feedback. Output requirements include the speed of the application in responding to inputs, data security through encryption, and an easy-to-use interface with a learning time of less than 10 minutes for new users.

2. Non-functional Requirement Analysis

Non-functional requirements for Pak Wagiman's Ice Cream ordering application include software such as Windows 10, Android Studio, Visual Studio Code, Node.js, PostgreSQL, and Android 8.0, as well as hardware. include Intel Core i5 10500H processor, 16GB RAM, 512GB SSD, INVIDIA GTX 1650 GPU, and smartphones with Helio G88, 4GB RAM, and 64GB storage.

4.5 System Design

In the system design stage of the RAD method for ice cream ordering application development, the design steps are focused on building a solid application structure through a series of visual diagrams and prototypes. Starting with the creation of use case diagrams, which help define user interactions with the main features of the application, then continued class diagram to identify the structure and function of the required classes. This stage ended with the prototyping of the user interface using wireframes in Figma, which allowed for the initial visualization of the appearance and user interaction within the application. This approach helped to ensure each design component was clearly mapped out before further development. The design of the ice cream ordering application system uses Unified Modeling Language (UML) to visualize the software design. The three UML diagrams used are Use Case Diagram for system and user interaction and class diagram for relation on database. Figure 2 explains the use case diagram of the ice cream ordering system.

The use case diagram in Figure 2 provides information that the actor in this system is the user (customer). Customers can access the login page, register, view menu, ice cream details, cart, confirm order, choose payment method and users will get transaction history. When the user selects the menu, the system will display ice cream variants. then when the user adds an ice cream product to the basket, the system will add the appropriate product, customers can also add or delete items. payment methods in the system also vary such as e-wallet or cash.

In Figure 3 which is a class diagram, the ice cream ordering application system has 5 tables, namely the ice cream table, user, chart, item, transaction, and transaction item.

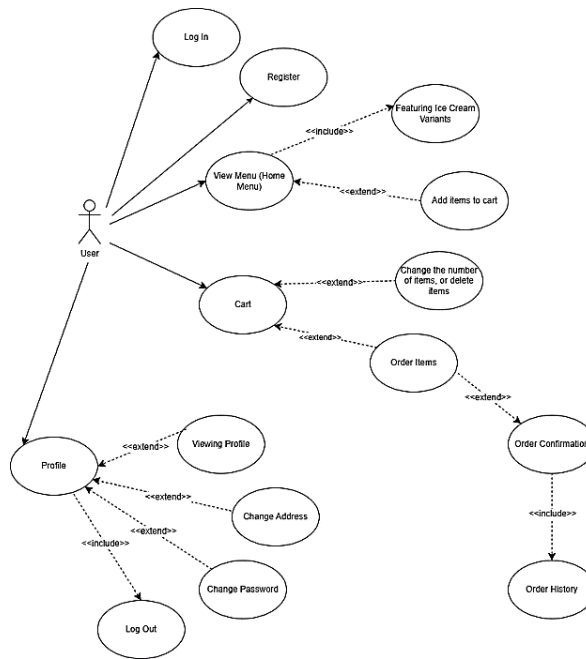


Figure 2. Use Case Diagram

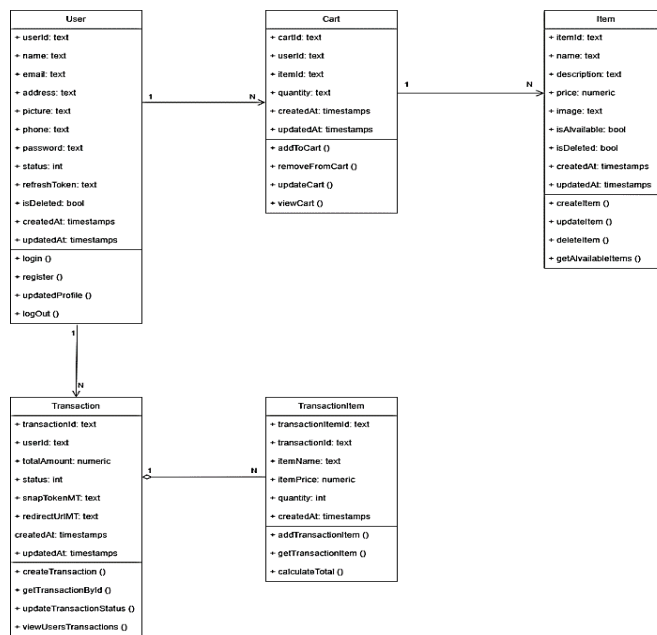


Figure 3. Class Diagram

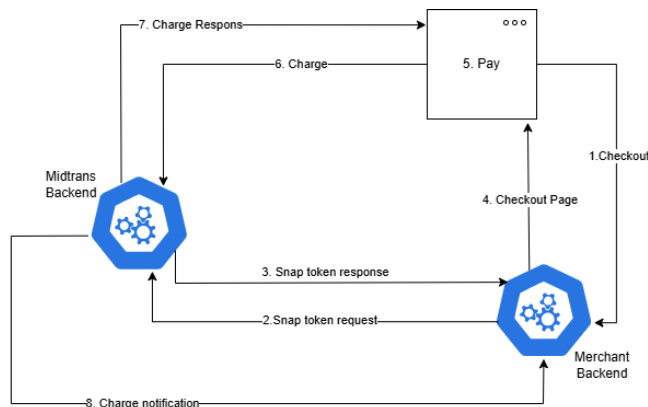


Figure 4. Model Architecture

In Figure 4, The system architecture model starts with a user selecting a product or service and checking out through the merchant's app or website. Next, the merchant backend sends a Snap token request to Midtrans to initiate payment, and Midtrans responds by sending the Snap token to the merchant backend. This token is then used to load the checkout page on the app or website, where the user can select the desired payment method. After that, the user completes the payment according to the instructions available on the page. Midtrans then processes the transaction by sending a "Charge" request and provides a response regarding the transaction status, whether successful, failed, or pending. As a final step, Midtrans sends a transaction status notification to the merchant's backend, so that the merchant can update the user's order status in their system. This process is designed to ensure a secure and efficient payment experience.

4.6 Construction

After the system design process, continue the construction process to implement the code into an application that can be used by users. The following are the results of construction on the ice cream ordering system.

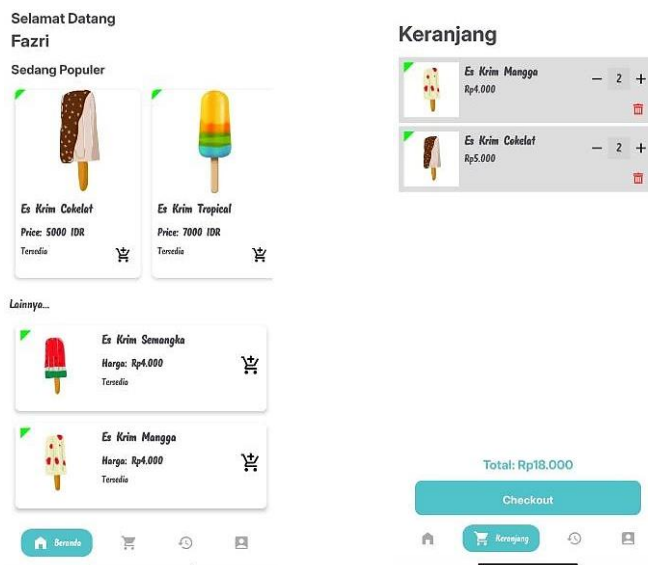


Figure 5. Home Page and Cart Page

In Figure 5, On the home page there are ice cream items and user names at the bottom of another ListView that displays ice cream items. After the user selects an item to put in the basket, the user can see it in the Basket menu section. The cart page contains item images, item names, item numbers, and item prices according to the number of items selected. The user can edit the order by increasing the number / decreasing the number of items, and can also delete items that do not want to be purchased, if the customer wants to order items, then the user can click the "Checkout" button.

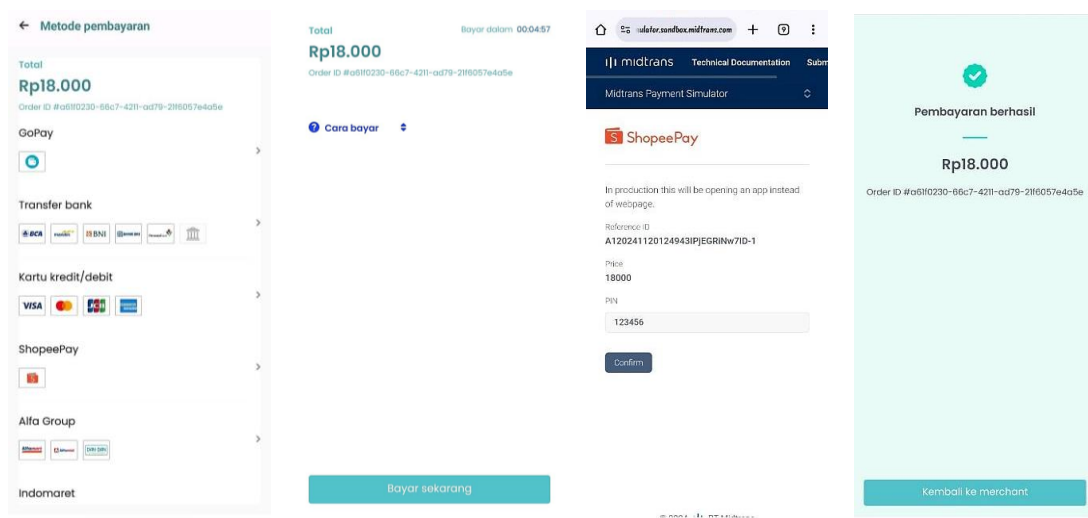


Figure 6. Method Payment Page

After the customer has checked out, it will be directed to the payment page in figure 6, here there are several options for users/customers to pay for the items that have been ordered, either through E-Wallet, credit card, or through supermarkets that partner with Midtrans. After the user/customer determines the payment option via the selected one, the user/customer is asked to make a payment by clicking the “Pay Now” button. After the user/customer clicks the “Pay Now” button on the previous page, the customer is asked to confirm the payment by entering a PIN if asked to enter a PIN, otherwise just “Pay”. After the customer successfully makes a payment, a notification will appear that “Payment is successful”. Customers can return to the homepage/main menu by clicking “Return to merchant”.

4.7 Cut Over

At this stage, testing is carried out using the black box testing method. Black box testing is done to evaluate software functionality without looking at its internal code or internal structure. This approval focuses on the input and output of the software to ensure that the application works according to predetermined specifications. The following in table 1 is the result of black box testing.

Table 1. Blackbox Testing Result

User Interaction	Expected Results	Test Result
Choose Login or Register in Login and Register option pages.	Can move to the Login and Register pages.	✓
Log In or Register.	After the user successfully login or registers, then can move to the menu Home.	✓
Selecting an ice cream item, through clicking add item to cart, on the Home menu, and the user selects Cart for the item. view the selected items.	Can display items that have entered the cart, and can delete, add/drop items to be ready for ordering/checkout, or cancel order by deleting the item.	✓
Clicking the Pay button.	Can move to page payment methods.	✓
Clicking the Pay Now or Cancel button.	When clicking Pay, it will move to the page Confirmed Order page, but if cancel, will move to the previous page which is the Basket Page.	✓
Clicking the View Order, or Home button on the order page is successfully created.	When clicking the View Order button, it will be directed to the History Page, whereas if you click the Home button, going to Home.	✓
Select the History menu in the navigation menu.	Can move to the history, and displays the user's order history data.	✓
Selecting profile menu at menu navigation, and select About Us.	Can page switch to Profile, and display About Us.	✓
Choose change Address, Security, and Tel.	Can display Alert dialog to change address, password and phone number.	✓

Based on the black box testing in table 1 that has been done, from 9 use case testing schemes get the appropriate results. This means that the entire functional system runs well and accordingly. This test includes several aspects such as appearance, speed, usability, reliability and satisfaction, which are assessed by 120 respondents. In the table 2 are the results of the respondent's assessment.

Table 2. Feasibility Testing Results and User Response

Aspect	Number of Respondents	Percentage
	Agreeing	
Display	48	96%
Speed	47	94%
Usability	47	94%
Reliability	49	98%
Satisfaction	48	96%
Total	239	478%
Average Percentage		95.6%

The test results in the table 2, with an average percentage of 95.6% showed that the app successfully met user expectations in the aspects of display, speed, usability, reliability, and satisfaction, where high scores on display (96%), reliability (98%), and satisfaction (96%) stood out. The user-friendly interface design was a major factor in the intuitive display, while system reliability ensured that the app was able to operate without interruption. The high level of user satisfaction reflects the success of the application in fulfilling the webathon, both in terms of accessibility and efficiency. However, aspects of speed (94%) and usability (94%) show

opportunities for improvement. Some users experienced longer loading times under certain network conditions, and the interface requires further customization to improve convenience. Slow response times can affect booking efficiency, while suboptimal usability can detract from the new user experience. Solutions to improve these two aspects include app code optimization, caching features, network performance testing, additional surveys, interactive guides, and interface design improvements.

When compared to the manual system, the app provides significant improvements in efficiency, minimizes errors, and speeds up customer response. It also optimizes business operations, including order management and reporting. This application can be widely applied, especially for small and medium enterprises. Future research can be done by improving push notifications and developing live chat features.

4. CONCLUSION

This research produces an Android-based Jadoel Ice Cream application to facilitate the management of Mr. Wagiman's ice cream orders. The RAD method applied in application development can help in building applications with short time and effective application results. This application features register, login, homepage, product menu, product details, cart, payment method and transaction history. The application has run as expected through black box testing which shows that all functions in the system have run 100% accordingly. Based on feedback from users and the results of feasibility testing which shows a response rate of 95.6% (very feasible) and received a positive response from users. However, this research has several limitations that still need to be considered, one of which is the notification system that is not yet optimal, because the notification is only in the application, there is no pop up notification. In future research, notification improvements can be made as well as application development by adding live chat features to facilitate communication between sellers and customers.

REFERENCES

- [1] D. Gabhane, Prof. Perumalla Varalaxmi, Umesh Rathod, and Dr. Byram Anand, "Digital Marketing Trends: Analyzing The Evolution Of Consumer Behavior In The Online Space," *Boletin de Literatura Oral - The Literary Journal*, vol. 10, no. 1 SE-Articles, pp. 462–473, 2023, Accessed: Nov. 25, 2024. [Online]. Available: <https://www.boletindeliteraturaoral.com/index.php/bdlo/article/view/141>
- [2] L. Stocchi, N. Pourazad, N. Michaelidou, A. Tanusondjaja, and P. Harrigan, "Marketing research on Mobile apps: past, present and future," *J Acad Mark Sci*, vol. 50, no. 2, pp. 195–225, 2022, doi: 10.1007/s11747-021-00815-w.
- [3] N. Bocken, L. S. Morales, and M. Lehner, "Sufficiency business strategies in the food industry-the case of oatly," *Sustainability (Switzerland)*, vol. 12, no. 3, 2020, doi: 10.3390/su12030824.
- [4] S. M. Wijaya, P. F. Metty, A. Wijaya, and C. R. Yukianti, "Business Feasibility Study Analysis of The Pianeta Ice Cream Dessert Business," *International Journal of Application on Economics and Business*, vol. 1, no. 1, pp. 249–259, 2023, doi: 10.24912/v1i1.249-259.
- [5] P. Tsarouhas, "Reliability, availability, and maintainability (RAM) study of an ice cream industry," *Applied Sciences (Switzerland)*, vol. 10, no. 12, pp. 1–20, 2020, doi: 10.3390/app10124265.
- [6] L. Sun, Z. Zhu, and D. W. Sun, "Regulating ice formation for enhancing frozen food quality: Materials, mechanisms and challenges," *Trends Food Sci Technol*, vol. 139, pp. 1–20, 2023, doi: 10.1016/j.tifs.2023.07.013.
- [7] G. S. Bagale *et al.*, "Retracted Article: Small and medium-sized enterprises' contribution in digital technology," *Ann Oper Res*, vol. 326, pp. 3–13, 2023, doi: 10.1007/s10479-021-04235-5.
- [8] M. Imran, "The Communication Channels and the Innovation Perception on The Adoption of E-Commerce in Micro, Small Medium Enterprises (MSMEs)," *Ilomata International Journal of Social Science*, vol. 4, no. 3, pp. 441–454, Aug. 2023, doi: 10.52728/ijss.v4i3.807.
- [9] F. Safieddine and I. Nakhoul, "Mobile Instant Messaging (M.I.M.) in Improving S.M.E. in Manufacturing: Case Study," *Wirel Pers Commun*, vol. 119, no. 2, pp. 1799–1815, Jul. 2021, doi: 10.1007/s11277-021-08307-4.
- [10] D. M. Gligor and M. J. Maloni, "More is not always better: The impact of value co-creation fit on B2B and B2C customer satisfaction," *Journal of Business Logistics*, vol. 43, no. 2, pp. 209–237, 2022, doi: 10.1111/jbl.12278.
- [11] H. Setiawan, W. Rahayu, and I. Kurniawan, "Perancangan Aplikasi Pemesanan Makanan dan Minuman pada Rumah Makan Cepat Saji D'besto," *Jurnal Riset dan Aplikasi Mahasiswa Informatika (JRAMI)*, vol. 1, no. 03, pp. 347–354, Jul. 2020, doi: 10.30998/jrami.v1i03.356.
- [12] V. B. Gulo, A. Triayudi, and A. Iskandar, "Sistem Informasi Aplikasi Pemesanan Makanan Restoran Berbasis Web Menggunakan Metode Agile Development," *Jurikom*, vol. 10, no. 1, pp. 154–164, Feb. 2023, Accessed: Nov. 25, 2024. [Online]. Available: <https://ejurnal.stmik-budidarma.ac.id/index.php/jurikom/article/view/5633>

- [13] R. R. Ilhamsyah and T. Tony, "Perancangan Aplikasi Pemesanan Angkringan Kanca Berbasis Mobile Web," *INTECOMS: Journal of Information Technology and Computer Science*, vol. 7, no. 1, pp. 9–18, Jan. 2024, doi: 10.31539/intecom.v7i1.8192.
- [14] M. Fang, W. Yang, H. Li, and Y. Pan, "Enhancing User Experience through Optimization Design Method for Elderly Medication Reminder Mobile Applications: A QFD-Based Research Approach," *Electronics (Switzerland)*, vol. 12, no. 13, pp. 1–24, 2023, doi: 10.3390/electronics12132860.
- [15] M. Defriani, M. G. Resmi, and O. A. Permana, "User Centered Design Method for Developing a Mobile-Based Product Distribution Application," *Sinkron*, vol. 7, no. 1, pp. 33–38, 2022, doi: 10.33395/sinkron.v7i1.11218.
- [16] D. K. Pramudito, S. S. Pettalongi, M. Risal Tawil, H. A. and A. Zein, "Application of Rapid Application Development Method to Design E-Commerce Systems in National Expedition Company to Increase Marketing Effectiveness," *Jurnal Informasi dan Teknologi*, vol. 6, no. 1, pp. 144–149, 2024, doi: 10.60083/jidt.v6i1.489.
- [17] S. Khan, R. K. Tailor, H. Uygun, and R. Gujrati, "Application of robotic process automation (RPA) for supply chain management, smart transportation and logistics," *Int J Health Sci (Qassim)*, vol. 6, no. 3, pp. 11051–11063, 2022, doi: 10.53730/ijhs.v6ns3.8554.
- [18] D. Van Dinh, "Digital economy and the electronic payment behavior: An empirical analysis," *Transnational Corporations Review*, vol. 16, no. 4, pp. 278–288, Dec. 2024, doi: 10.1016/j.tncr.2024.200078.
- [19] A. M. Gai, M. Zakaria, I. Harsono, T. Widia Nurdiani, and A. Razak Munir, "Analysis of The Influence of Digital Payment Process, Quality of Application, and Online Service on Repurchase Intention of Online Shopping Platform Customers," *Jurnal Informasi dan Teknologi*, vol. 6, no. 1, pp. 200–205, 2024, doi: 10.60083/jidt.v6i1.499.
- [20] D. Agustin, "Design Smarhome Application with Rapid Application Development (RAD) Method Based on Hybrid Mobile," *Jurnal Teknologi Informasi dan Pendidikan*, vol. 16, no. 1, pp. 86–96, 2023, doi: 10.24036/jtip.v16i1.698.
- [21] Y. Yumhi, D. Dharmawan, W. Desty Febrian, A. J. Sutisna, and Syahribulan, "Application of Rapid Application Development Method in Designing a Knowledge Management System to Improve Employee Performance in National Construction Company," *Jurnal Informasi dan Teknologi*, vol. 6, pp. 155–160, 2024, doi: 10.60083/jidt.v6i1.491.
- [22] R. Riana, A. Cristian, and Y. Purbasari, "Rancang Bangun Aplikasi Inventaris Barang Berbasis Android Pada PT. Nuansa Indah Mane," *Jurnal Pengembangan Sistem Informasi dan Informatika*, vol. 4, no. 4, pp. 37–45, 2023, doi: 10.47747/jpsii.v4i4.1401.
- [23] E. R. Subhiyakto, F. Agustina, and C. V. Reswara, "Pengembangan Aplikasi Evaluasi Kegiatan Berbasis Android menggunakan Metode RAD (Rapid Application Development)," *Jurnal Ilmiah Intech : Information Technology Journal of UMUS*, vol. 5, no. 1, pp. 49–59, 2023, doi: 10.46772/intech.v5i1.1082.
- [24] I. Alfajri, N. Faizah, and R. R. WP, "Aplikasi Sistem Persediaan Barang Gudang Pt. Berkah Pena Ilmu Menggunakan Android Studio Dan Metode Rapid Application Development (RAD)," *Jurnal Indonesia : Manajemen Informatika dan Komunikasi*, vol. 4, no. 1, pp. 15–23, 2023, doi: 10.35870/jimik.v4i1.106.
- [25] R. Haerani and Haviza, "Rancang Bangun Aplikasi Pemesanan Menu Kuliner Berbasis Android," *JSiI (Jurnal Sistem Informasi)*, vol. 9, no. 1, pp. 70–76, Mar. 2022, doi: 10.30656/jsii.v9i1.4453.
- [26] T. Wahyuningrum, G. F. Fitriana, A. C. Wardhana, M. A. Sidiq, and D. Wahyuningsih, "Developing Suicide Risk Idea Identification for Teenager (SERIINA) Mobile Apps Prototype using Extended Rapid Application Development," in *2021 9th International Conference on Information and Communication Technology, ICoICT 2021*, Yogyakarta, 2021, pp. 92–97. doi: 10.1109/ICoICT52021.2021.9527508.
- [27] R. Novita, "Implementasi Model Rapid Application Development untuk Pengembangan Pembelajaran Tajwid Al-Qur'an," *MALCOM: Indonesian Journal of Machine Learning and Computer Science*, vol. 3, no. 1, pp. 68–75, Sep. 2023, doi: 10.57152/malcom.v3i1.892.
- [28] Y. Yuricha and I. K. Phan, "Rancang Bangun Aplikasi Jurnal Perkuliahan Berbasis Progressive Web Application Menggunakan Metode Rapid Application Development," *MALCOM: Indonesian Journal of Machine Learning and Computer Science*, vol. 4, no. 3, pp. 901–910, May 2024, doi: 10.57152/malcom.v4i3.1370.
- [29] M. Mkansi, S. de Leeuw, and O. Amosun, "Mobile application supported urban-township e-grocery distribution," *International Journal of Physical Distribution and Logistics Management*, vol. 50, no. 1, pp. 26–53, 2020, doi: 10.1108/IJPDLM-10-2018-0358.
- [30] S. H. Liao and C. H. Ho, "Mobile Payment and Mobile Application (App) Behavior for Online Recommendations," *Journal of Organizational and End User Computing*, vol. 33, no. 6, pp. 1–26, 2021, doi: 10.4018/JOEUC.20211101.0a2.

- [31] R. Kaban, S. R. Danur, and R. Zuliaty, "Penerapan Metode Rapid Application Development (RAD) dalam Perancangan Sistem Informasi Penjualan Berbasis Web," *Jurnal Informatika Dan Perancangan Sistem (JIPS)*, vol. 4, no. 2, pp. 1–7, 2022.
- [32] S. Somantri, G. P. Insany, and R. R. Putra, "Perancangan Sistem Bimbingan Syarat Kecakapan Umum Pramuka Berbasis Android," *Idealis: Indonsia Journal Information System*, vol. 6, no. 2, pp. 201–210, Jul. 2023, doi: 10.36080/idealis.v6i2.3038.