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## Innovation of an android-based beverage sales application using a design thinking approach for MSME digitalization in Nabire

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### ABSTRACT

Digital transformation has become an essential requirement for Micro, Small, and Medium Enterprises (MSMEs) to improve competitiveness and operational efficiency. This study aims to design an Android-based beverage sales application prototype to support MSME digitalization in Nabire Regency. The research employed the Design Thinking approach, consisting of empathize, define, ideate, prototype, and test stages. Activity diagrams were used to model the application's business processes, while the prototype was developed using Figma as an interactive and visual system representation. Usability evaluation was conducted through limited testing using the Single Ease Question (SEQ) and System Usability Scale (SUS). The results indicate that the proposed prototype provides a clear user flow, aligns with user needs, and achieves a good level of usability. The developed prototype can serve as a foundation for future implementation of an Android-based beverage sales application to support MSME digitalization in Nabire Regency.

**Keywords:** design thinking; application prototype; android; beverage sales; MSMEs

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RESEARCH & PUBLISHING



## 1. INTRODUCTION

Digital transformation has become a strategic factor in enhancing the competitiveness of Micro, Small, and Medium Enterprises (MSMEs) amid the rapid growth of the digital economy (Ramadhan & Aji, 2024). The adoption of digital platforms enables MSMEs to expand market reach, improve operational efficiency, and strengthen consumer engagement through technology-driven transaction systems (Prayitno et al., 2025). In the culinary sector, particularly beverage sales, the fast-paced and repetitive nature of transactions positions mobile commerce applications as an increasingly relevant solution to support MSME digitalization (Stocchi et al., 2021).

One of the rapidly developing technologies widely adopted by the public is Android-based mobile applications, which offer ease of access and flexibility of use (Hendarto et al., 2024). Mobile applications have demonstrated significant influence on consumer purchasing behavior and MSME operational performance, especially through improved ordering processes, transparency, and customer convenience (Wati et al., 2025). In addition, the integration of QR-based mobile payment systems has become a key driver of digital commerce adoption in emerging economies, offering scalable transaction models for MSME environments (Khanyi et al., 2024).

However, in Nabire Regency, Papua Tengah, the adoption of digital technology by beverage-selling MSMEs remains relatively limited, with most business actors still relying on conventional and manual sales methods. This condition creates operational barriers, such as transaction recording errors, limited customer outreach, and restricted access to product information for consumers. This reflects the broader challenge of digital disparity between urban-centered MSME transformation and peripheral regional contexts (Badrinarayanan et al., 2022; Becker & Schmid, 2020).

In the application development process, prototypes play a crucial role as early representations of the system, enabling the evaluation of design concepts and user workflows prior to full-scale implementation (Wiley & Blackwell, 2022). Prototypes function as boundary objects that facilitate communication between developers and stakeholders while reducing design risk at early stages of innovation (Holdaś & Wierzbicka, 2024).

One of the most widely adopted approaches in user-centered system design is Design Thinking (Mansa et al., 2024). This framework emphasizes empathy-driven innovation and iterative prototyping through the stages of empathize, define, ideate, prototype, and test, enabling digital solutions to be grounded in real user needs rather than purely technical assumptions.

Despite the growing body of research on MSME digitalization and mobile commerce systems, most prior studies have been conducted in urban environments with relatively advanced technological infrastructure (Lee et al., 2025; Kumar, 2024). Studies that specifically examine Design Thinking-driven Android beverage sales prototypes for MSMEs in developing regional contexts such as Papua and Nabire Regency remain very limited. This indicates both a contextual gap and a methodological gap in prior research (Tarigan et al., 2025; Adeyemo, 2024).

Based on the study conducted by Azzahra et al. (2025), the implementation of a mobile sales dashboard application enables MSMEs to analyze sales data in real time, reduce errors associated with manual data entry, and support more strategic business decision-making. This implementation leads to improved operational efficiency and transparency, as evidenced by a study in which 90.625% of users reported that the application was easy to use and beneficial for their needs. Furthermore, research on MSME digitalization has predominantly been conducted in urban areas with relatively high levels of technological literacy and adoption. Studies that specifically examine the design of Android-based beverage sales application prototypes for MSMEs in regions such as Nabire Regency remain very limited. In addition, the explicit application of the Design Thinking approach in the prototype design stage of MSME applications in the Papua region has not been extensively explored in previous research.

In the study conducted by Erfiansyah et al. (2022), it is explained that Android-based applications can automate sales transactions and internal controls, thereby reducing the time and effort required for manual processes. Such automation enables MSMEs to serve customers more efficiently, leading to increased customer satisfaction and business revenue. The use of interactive prototypes has been proven

effective in identifying design weaknesses at the early stages of system development. Nevertheless, most of these studies remain general in nature and have not specifically accommodated the needs and characteristics of local MSMEs in regions where the level of digitalization is still developing.

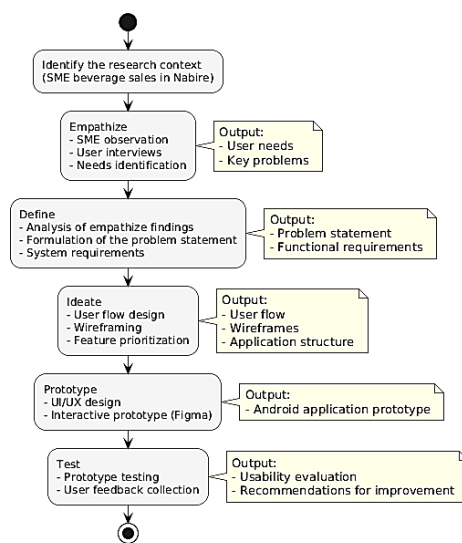
Therefore, the novelty of this study lies in integrating (1) local MSME user needs assessment, (2) systematic Design Thinking-based prototype development, and (3) usability evaluation using standardized metrics such as the System Usability Scale (SUS) and Single Ease Question (SEQ). The SUS remains one of the most validated usability measurement tools in human–computer interaction research (Ningsih & Tjahjono, 2024).

As an effort to address these issues, the design of an Android-based beverage sales application prototype can serve as a realistic and practical initial solution (Sukianto & Pramono, 2025). By employing the Design Thinking approach, the application design process can be focused on the actual needs of users, including both MSME operators and consumers (Akhsin & Irianto, 2025). An interactively designed prototype enables the evaluation of user interface design and system workflows prior to full-scale implementation. The integration of key features such as product catalogs, shopping carts, and multiple payment method options is expected to enhance the effectiveness and convenience of beverage sales transactions (Hendarto et al., 2024).

The urgency of this study is grounded in the pressing need for MSME digitalization in regional areas to enhance business competitiveness and sustainability. This research offers a practical initial solution without requiring immediate entry into complex and high-cost system implementation stages. The findings are expected to be utilized by MSME practitioners as an initial reference for business digitalization, by application developers as a foundation for system development, and by local governments as consideration material in formulating information technology–based MSME development policies. Accordingly, this study makes a tangible contribution to the advancement of applied informatics research that is oriented toward the needs of local communities.

## 2. METHOD

This study employed a descriptive qualitative research design with a Design Thinking framework as the primary methodological approach for developing an Android-based beverage sales application prototype for MSME digitalization in Nabire Regency. The research focused on prototype design and usability evaluation rather than full software implementation. The main output of this research is an application prototype rather than a fully implemented system. See Figure 1



**Figure 1. Research Flow Diagram Based on the Design Thinking Method**

Source: Author’s Design (2025)

## **2.1. Research Setting and Unit of Analysis**

The study was conducted in Nabire Regency, Papua Tengah, Indonesia, where beverage-selling MSMEs constitute a dominant segment of local small-scale entrepreneurship. The unit of analysis in this research was the beverage sales transaction workflow, including order placement, shopping cart management, payment selection, and order status monitoring.

## **2.2. Population and Participants**

The population consisted of two main user groups: Beverage MSME owners/operators in Nabire Regency, Consumers who regularly purchase beverages from local MSMEs. A purposive sampling technique was applied to ensure that participants represented the intended application users. Inclusion criteria were: MSME owners actively selling beverages, Consumers familiar with smartphone-based transactions, Participants willing to engage in prototype testing. A total of 12 respondents participated in the usability evaluation, consisting of 6 MSME owners and 6 consumers, which is considered sufficient for usability-focused prototype testing in early-stage user-centered design research.

## **2.3. Data Collection Procedures**

Data were collected between January and March 2025 through the following procedures: Field observation of manual transaction practices among beverage MSMEs, Semi-structured interviews with MSME actors and consumers to identify operational problems and user needs, Prototype interaction testing sessions using task-based usability scenarios. To minimize bias, data triangulation was applied through cross-validation between observation findings, interview responses, and usability testing feedback.

## **2.4. Design Thinking Implementation**

At the empathize stage, the researchers conducted observations and interviews with micro, small, and medium enterprise (MSME) actors engaged in beverage sales in Nabire Regency, including vendors of cold beverages and contemporary drinks. The interview results indicated that most MSME actors still receive orders directly or via instant messaging applications (e.g., WhatsApp) and record transactions manually. MSME actors reported difficulties in managing orders when the number of customers increases, which often leads to recording errors. From the consumer perspective, observations revealed that customers experience difficulties in obtaining complete information regarding beverage menus, prices, and product availability without visiting the location in person. Consumers also expressed interest in an application that provides a beverage catalog and supports non-cash payment options.

Based on the results of the empathize stage, the main problems were formulated as follows: beverage-selling MSME actors in Nabire Regency experience difficulties in managing sales transactions and reaching a broader customer base due to their continued reliance on conventional sales methods, while consumers require easier access to product information and fast, practical transaction processes. In addition, the primary system requirements were identified, including: the application must provide an easily accessible beverage catalog; the application must support product selection and a shopping cart feature; and the application must offer multiple payment options, such as Cash on Delivery (COD), QRIS, and virtual accounts.

At the ideate stage, the researchers developed solution concepts by systematically modeling the interactions between users and the system. To represent this process, activity diagrams were employed as the primary artifact for illustrating the business processes of the Android-based beverage sales application. The activity diagrams were used to visualize the end-to-end sequence of user activities and system responses, enabling a comprehensive analysis of the application workflow prior to the interface design stage. See [Figure 2](#)

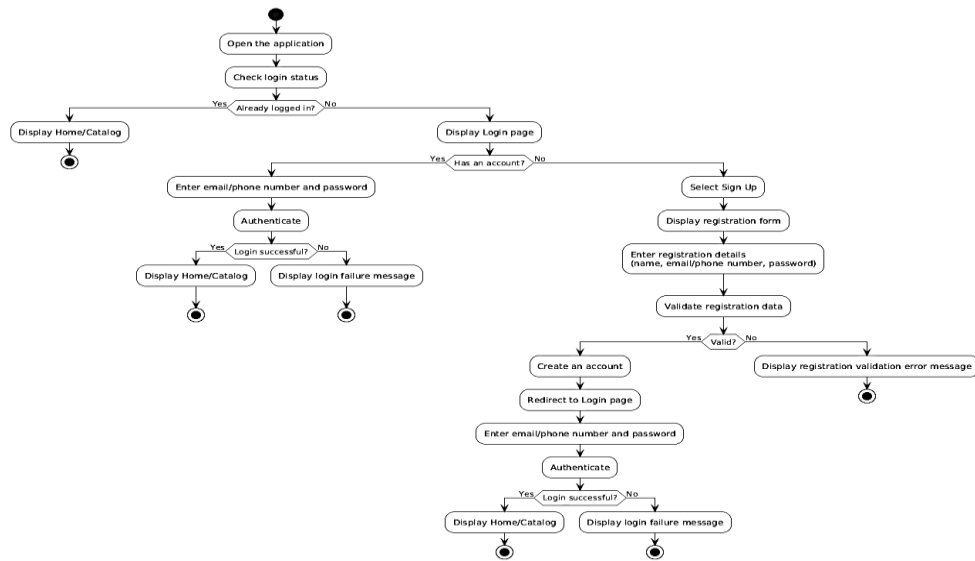


Figure 2. User Authentication Workflow (Login and Sign-Up)

Source: Author’s Design (2025)

The resulting activity diagram illustrates the user flow starting from the login and sign-up processes, accessing the beverage catalog, product selection, shopping cart management, through to the checkout and payment processes. In the initial stage, the diagram depicts the condition of users who do not yet have an account and are therefore directed to complete the sign-up process before proceeding to the login stage. After successfully entering the system, users are able to access the beverage catalog, view product details, and select beverages to be added to the shopping cart (Figure 3).

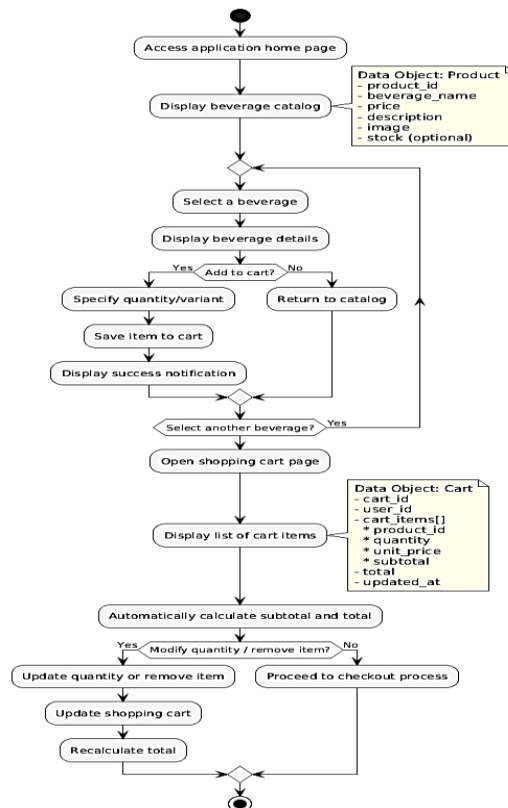
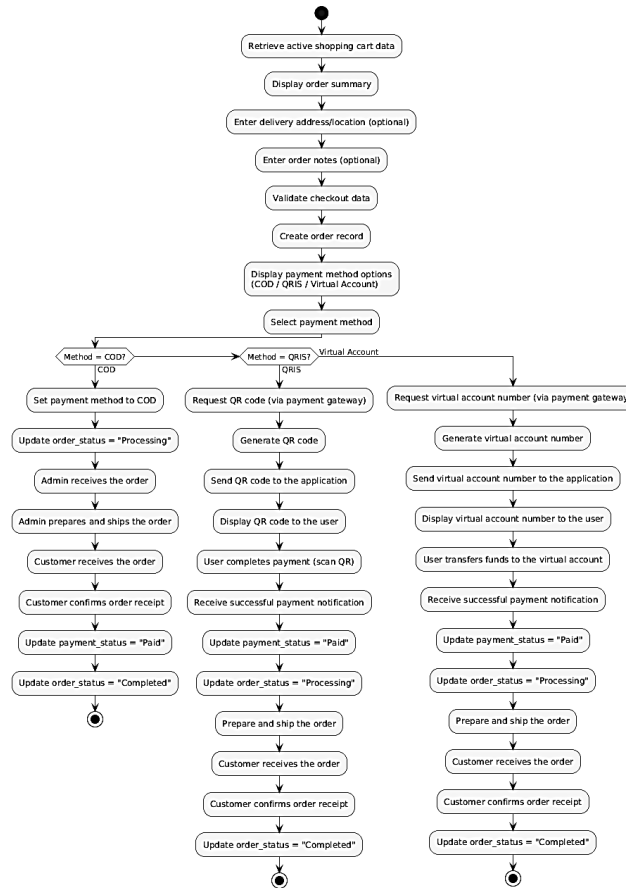


Figure 3. Beverage Catalog and Shopping Cart Workflow

Source: Author’s Design (2025)

Furthermore, the activity diagram models the shopping cart management process, including modifications to product quantities and the automatic calculation of the total price by the system. The diagram also illustrates the checkout stage, which encompasses the selection of payment methods, namely Cash on Delivery (COD), QRIS, and Virtual Account. For each payment method, decision points are presented to represent differences in process flows as well as the involvement of external parties, specifically a payment gateway, in non-cash payment transactions. In addition, the diagram depicts changes in order status from the payment process until the order is declared completed (Figure 4).



**Figure 4. Checkout and Payment Workflow (COD, QRIS, and Virtual Account)**

Source: Author’s Design (2025)

The use of activity diagrams at the ideate stage assisted the researchers in identifying system functional requirements more clearly, including user authentication, product catalog management, shopping cart management, and the integration of payment methods. Activity diagrams also served as a foundation for determining the application’s navigation structure and the placement of interface elements during the prototype stage. Consequently, the proposed solution not only focused on visual appearance but also ensured that the application workflow was logical, efficient, and aligned with the needs of MSME actors and consumers in Nabire Regency. The activity diagrams produced at the ideate stage were used as the primary reference in designing the application prototype. Each activity and decision represented in the diagrams was translated into interface layouts and interaction flows within the prototype. Through this approach, the resulting prototype demonstrates a strong alignment between business processes, user requirements, and interface design.

At the prototype stage, the researchers developed the application interface design using Figma based on the previously created wireframes. The prototype includes a home screen featuring a beverage catalog, product detail pages, a shopping cart that automatically displays the total price, and a checkout

page with payment method options, namely Cash on Delivery (COD), QRIS, and Virtual Account. The prototype was designed as a high-fidelity model, enabling users to simulate the beverage purchasing flow visually, from product selection to transaction completion. This prototype was used as a system representation to obtain user feedback prior to the full application development stage.

At the test stage, the prototype was evaluated by several MSME actors and consumers in Nabire Regency. Users were asked to perform a simulated beverage purchasing process using the prototype and subsequently provide feedback regarding ease of use, clarity of the interface, and feature completeness.

### **2.5. Single Ease Question (SEQ)**

The Single Ease Question (SEQ) was used to measure the level of ease experienced by users in completing each task during the usability testing. Respondents provided ratings on a 1–7 scale (1 = very difficult, 7 = very easy). The SEQ score was obtained by calculating the average of respondents' scores for each task. A higher mean score indicates that the task is easier to complete. The formula for calculating the average SEQ score per task is as follows:

$$\underline{SEQ}(T_k) = \frac{1}{n} \int_{i=1}^n SEQ_i \quad (1)$$

For example, a single respondent completed one task (T1) and assigned an SEQ score of 6. Because there was only one respondent ( $n = 1$ ), the average SEQ value for that task is equal to the score provided by the respondent. The calculation result is as follows:  $SEQ(T1) = 6$ .

The Single Ease Question (SEQ) is used to measure the level of ease experienced by users when completing specific tasks within the prototype, such as the login process, product selection, or checkout. SEQ provides rapid and focused feedback on each interaction flow, thereby assisting researchers in identifying interface elements or processes that are still perceived as difficult by users. The SEQ results serve as a basis for iterative design improvements in accordance with the principles of user-centered design in Design Thinking (Hariri et al., 2022).

### **2.6. System Usability Scale (SUS)**

The System Usability Scale (SUS) was used to evaluate the overall usability of the system. This instrument consists of 10 statements measured using a 1–5 Likert scale. Odd-numbered items are positively worded, while even-numbered items are negatively worded. The SUS score is calculated by converting each item score, summing all item scores, and then multiplying the total by a factor of 2.5 to obtain a final score ranging from 0 to 100. The SUS calculation formula is as follows:

$$SUS = (\int_{j=1}^{10} S_j) \times 2.5 \quad (2)$$

For example, a single respondent provided Likert-scale ratings for the 10 SUS items as follows: item 1: 4, item 2: 2, item 3: 4, item 4: 1, item 5: 5, item 6: 2, item 7: 4, item 8: 1, item 9: 5, and item 10: 2. The SUS score was calculated by subtracting 1 from the scores of the odd-numbered items and subtracting the scores of the even-numbered items from 5. The converted scores of all items were then summed, resulting in a total score of 32. The SUS value was obtained by multiplying this total score by 2.5. Thus, the final results were a total score of 32 and an SUS score of 80.

The System Usability Scale (SUS) is used to evaluate the overall usability of the system based on users' perceptions after interacting with the prototype. SUS provides a comprehensive overview of the system's ease of use, consistency, and user acceptance. Within the Design Thinking method, SUS results function as an evaluative indicator to assess whether the proposed solution meets user needs and is suitable to proceed to the full system development stage (Sembodo et al., 2021).

### 3. RESULT AND DISCUSSION

This study demonstrates that applying the Design Thinking framework provides a structured and user-centered pathway for designing an Android-based beverage sales application prototype tailored to MSME digitalization in Nabire Regency. The results confirm that the produced design artifacts—particularly the activity diagrams and high-fidelity prototype—are not merely technical outputs but represent a systematic translation of real user needs into practical digital solutions.

#### 3.1. Prototype Design in Relation to MSME Digitalization Needs

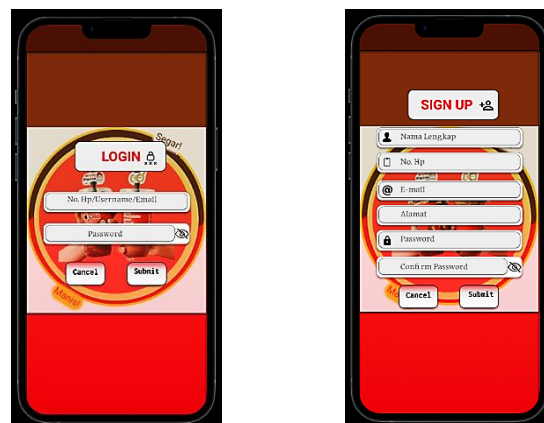
The prototype development results indicate that the activity diagrams effectively served as a foundational blueprint for ensuring workflow consistency across key transaction processes, including authentication, beverage catalog browsing, shopping cart management, checkout, payment selection, and order status monitoring. This alignment ensures that each functional requirement identified during the empathize and define stages was logically translated into interface elements and interaction flows.



**Figure 5. Home Pages in the Application**

The Android-based beverage sales application prototype was designed using Figma with a high-fidelity approach, enabling it to realistically represent the application’s interface and usage workflow.

The Android-based beverage sales application prototype shown in [Figure 5](#) was designed in alignment with the previously developed activity diagrams. The workflow begins at the home page, which serves as the initial point of user interaction by displaying the application identity, Olla Drink Nabire, along with two primary actions, namely Login and Sign Up. This page represents the initial state in the activity diagram, where users determine the authentication path based on their account ownership status. See [Figure 6](#)



**Figure 6. Login and Singup Pages in the Application**

Furthermore, the Login page visualizes the user authentication process as depicted in the activity diagram, including input fields for phone number/username/email and password, as well as submit and cancel actions that function as decision points. Meanwhile, the Signup page represents the new user registration flow, consisting of primary data inputs (full name, phone number, email, address, and password) that serve as prerequisites before users can proceed to the main application processes. See Figure 7

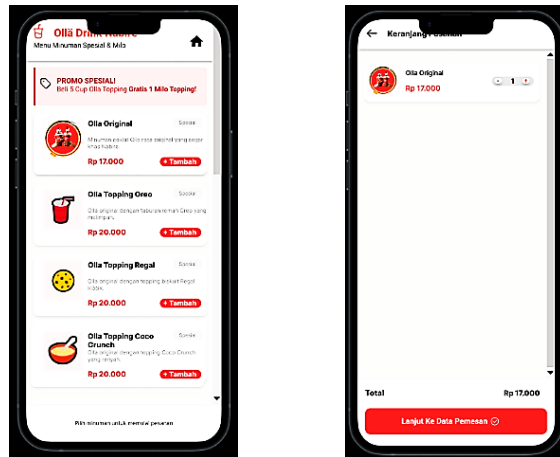


Figure 7. Beverage Catalog Page and Shopping Cart

After the user successfully logs into the system, the process flow continues to the beverage catalog page, which represents the activity of displaying the product list. On this page, the system presents a list of beverages complete with product names, brief descriptions, prices, and promotional indicators, enabling users to easily select the desired products and add them to the shopping cart.

The subsequent stage is illustrated by the shopping cart page, which represents the cart management activity in the activity diagram. On this page, users can view a summary of the selected products, adjust order quantities, and monitor the total price, which is automatically calculated by the system. The presence of the “Proceed to Order Details” button indicates a decision point for users to continue the process to the checkout stage.

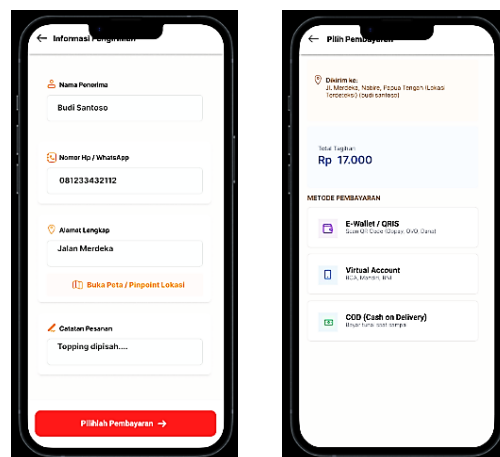


Figure 8. Delivery Information and Payment Options Page

Subsequently, the delivery information page represents the activity of entering order details (Figure 8), in which users provide recipient information, contact numbers, full delivery addresses, delivery

location points, and additional order notes. This stage is aligned with the activity diagram, which positions data entry as a prerequisite before the selection of a payment method.

The final stage of the prototype is presented through the payment options page, which represents the activity of selecting a payment method. The system provides three payment alternatives, namely E-Wallet/QRIS, Virtual Account, and Cash on Delivery (COD), in accordance with the branching flows depicted in the activity diagram. The presentation of these payment options demonstrates the system’s flexibility in accommodating user preferences and the characteristics of MSME transactions in Nabire Regency.

The beverage catalog feature, combined with cart automation and multi-payment support (COD, QRIS, Virtual Account), addresses the operational challenges observed among beverage MSMEs in Nabire, where transactions are still largely conducted manually. Similar to findings from prior MSME mobile commerce studies, digital transaction features improve efficiency, transparency, and customer convenience by reducing reliance on handwritten records and fragmented communication channels (Gill et al., 2022). However, this study extends the literature by situating the prototype design within a peripheral region context, where digital adoption remains limited compared with urban-centered MSME studies.

Moreover, the inclusion of an order-status tracking mechanism contributes to service clarity and consumer trust, as customers can monitor transaction progress from “Order Received” to “Delivered.” This transparency reflects best practices in modern mobile commerce systems and supports MSME competitiveness by improving customer engagement.

### 3.2. Usability Testing Outcomes and Interpretation

The usability evaluation results indicate that the prototype achieved an average System Usability Scale (SUS) score of 80.0, which falls within the “good to very good” category of usability acceptance. This suggests that respondents perceived the prototype as easy to use, coherent, and aligned with their expectations for beverage ordering applications. See [Table 1](#)

**Table 1. Summary of Prototype Usability Testing Results**

Evaluation Component	Summary of Results
Number of respondents	N = 12 (6 MSME owners, 6 consumers)
SUS score	Average 80.0 (MSME owners: 73.8; Consumers: 86.3)
T1 Login	Success rate 100%; Time 28 s; SEQ 6.2
T2 Product search & detail view	Success rate 92%; Time 44 s; SEQ 5.8
T3 Cart management (add & update quantity)	Success rate 83%; Time 78 s; SEQ 5.1
T4 QRIS payment (QR code displayed)	Success rate 88%; Time 62 s; SEQ 5.6
T5 Virtual Account payment (VA displayed)	Success rate 75%; Time 85 s; SEQ 4.9
T6 Cash on Delivery (order confirmation)	Success rate 100%; Time 50 s; SEQ 6.1
Key findings	The main usability issues were identified in cart quantity modification and Virtual Account payment. Design recommendations include improving the visibility of the primary call-to-action (CTA), simplifying quantity controls in the cart, and providing clearer and more concise Virtual Account payment instructions.

Task-level findings further reveal that login and COD payment tasks achieved the highest success rates (100%), demonstrating that basic transaction flows were intuitive for both MSME owners and consumers. However, friction points emerged in shopping cart quantity modification and Virtual

Account payment processes, where lower success rates (83% and 75%) and longer completion times were observed. These findings highlight specific interface design elements that require refinement, such as simplifying quantity controls, improving call-to-action visibility, and presenting payment instructions more concisely.

The combined use of SEQ and SUS provides both micro-level task difficulty insights and macro-level usability acceptance, supporting iterative improvement in line with Design Thinking principles (Hariri et al., 2022; Sembodo et al., 2021).

### **3.3. Contribution to Prior Research and Identified Research Gap**

While previous studies have widely addressed MSME digitalization through general mobile commerce solutions, most research has been concentrated in technologically advanced urban regions. This study contributes a contextual novelty by focusing on Nabire Regency in Papua Tengah, where beverage MSMEs face distinct challenges related to limited digital infrastructure, localized consumer behavior, and low adoption of integrated ordering systems.

Methodologically, this research provides added value through the explicit integration of Design Thinking stages with usability validation instruments (SUS and SEQ) in one systematic framework. The findings strengthen the argument that Design Thinking is not only suitable for conceptual innovation but also effective for producing usable prototypes that can serve as foundations for real application deployment in developing regional MSME environments.

Therefore, this study contributes to applied informatics and MSME digital transformation research by offering an empirically grounded prototype model that bridges the gap between user-centered design theory and local business digitalization needs in underexplored settings.

### **3.4. Practical Implications and Future Development**

Practically, the prototype can serve as an early-stage reference for MSME beverage sellers, software developers, and local policymakers aiming to support community-based digital transformation. The design outcomes indicate that even low-cost prototype development, when guided by Design Thinking, can provide a clear roadmap toward scalable digital commerce implementation.

Future research should involve larger-scale field trials, integration with real payment gateway systems, and longitudinal evaluation of business impacts such as sales growth, operational cost reduction, and customer satisfaction improvements after full implementation.

## **4. CONCLUSION**

This study successfully designed an Android-based beverage sales application prototype to support the digitalization of MSMEs in Nabire Regency using the Design Thinking approach. The implementation of the empathize, define, ideate, prototype, and test stages resulted in an application design that is oriented toward user needs. Activity diagrams were employed as the basis for modeling business process workflows and were consistently translated into the prototype interface design, thereby ensuring a clear and systematic application usage flow.

The usability evaluation results indicate that the prototype demonstrates a good level of usability, as reflected by the System Usability Scale (SUS) and Single Ease Question (SEQ) scores, which fall within acceptable categories. The prototype is able to represent the beverage ordering process from product selection to order status monitoring and can serve as a foundation for subsequent application development stages in supporting the digitalization of beverage-selling MSMEs in Nabire Regency.

### **Ethical Approval**

Not Applicable

### **Informed Consent Statement**

Not Applicable

### **Authors' Contributions**

UA contributed to research conceptualization, methodology design, formal analysis, results validation, and writing – review and editing of the manuscript. HYRR contributed to data collection, prototype testing, initial data processing, and writing – original draft preparation under the supervision of the lead author.

### **Disclosure statement**

No potential conflict of interest was reported by the author(s).

### **Data Availability Statement**

The data presented in this study are available on request from the corresponding author due to privacy reasons.

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This research received no external funding.

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#### **Heris Yosua Ramase Rony**

Heris Yosua Ramase Rony is an undergraduate Informatics student at STMIK Pesat Nabire. His interests focus on software engineering, and he is involved in assisting faculty research activities.

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