International Journal of Scientific Multidisciplinary Research (IJSMR)
Vol. 4, No. 1, 2026: 57 - 68

Development of Whatsapp Based E-Groceries Services with a Design Thinking Approach

Musfi Yuliadi[1]*, Ahmad Rusdiansyah[2]
Institut Teknologi Sepuluh Nopember
Corresponding Author: Musfi Yuliadi ymusfi@gmail.com

A R T I C L E I N F O

Keywords: E-Groceries, Whatsapp, Design Thinking, User Persona, *Chatbot*

Received : 12, November
Revised : 13, December
Accepted: 27, January

A B S T R A C T

One of the developments in multichannel commerce is the emergence of e-groceries services. This e-groceries aims to make it easier for people to get processed food ingredients online. Developing an e-groceries application using a design thinking approach is a development process based on observing the needs of its users and defining the problems encountered in order to obtain solutions to these problems. The research method used was interviews and observations with 35 Pasarmu.id customers. This research is a qualitative study that describes the typology and persona of Pasarmu.id customers and assesses customer experiences after using the WhatsApp-based Pasarmu.id platform. This research was conducted from September to December 2023, the respondents of this research were Pasarmu.id customers who had used the Pasarmu.id platform. The largest typology of customers based on gender is 33 women (94.29%) while 2 people are men (5.71%), the most common jobs are housewives 8 people (22.86%) and private employees 8 people (22, 86%), based on the generational age range, the largest number of customers are Generation Y (Millennials) with 29 people (82.86%) and Generation X with 6 people (17.14%). Based on the highest shopping frequency 3 times per month, 18 people (51.43%).

INTRODUCTION

The COVID-19 pandemic catalyzed a profound digital transformation in Indonesia. Social restrictions necessitated a shift toward smartphone-based grocery solutions. Data from Redseer indicates that 60% of Indonesian respondents intend to continue purchasing cooking ingredients online post-pandemic. Furthermore, Google Trends data reveals a 24% year-on-year (yoy) increase in searches for basic staples in early 2022, with searches for "vegetables" (sayur) surging by 90%.

Pasarmu.id, established in 2020, transitioned from Platform 1.0 to Platform 2.0 in June 2022. While version 1.0 utilized separate accounts for web and mobile, version 2.0 integrated these into a unified system with a complex sub-module structure. This structural consolidation increased friction in the user journey, causing daily transactions to plummet from 20 to 10 orders. Users subsequently reverted to manual behavior, bypassing the automated system to message customer service directly via WhatsApp. Utilizing the WhatsApp Business API offers a strategic opportunity to automate user interactions within a familiar environment. Unlike the "Linear Sequential Model" proposed in earlier e-grocery studies (e.g., Kosasi, 2015), which often fails to account for user frustration during system changes, the Design Thinking framework allows for an iterative redesign that prioritizes human empathy over rigid technical architecture.

This research aims to develop a human-centered e-grocery service by applying a Design Thinking approach. The goal is to identify specific pain points and integrate the Pasarmu.id web-order system with a rule-based WhatsApp chatbot to create a frictionless transaction environment. This study systematically identified the research gap by comparing the parameters, findings, and relevance of this study with previous studies, namely:

1. Sandy Kosasi (2015): Researched e-groceries systems using a linear sequential model with a focus on front-end operations and content management.
   Gap: This study fills the gap using a design thinking approach and focuses on the development of a WhatsApp-based platform.
1. Dela Astria (2021) & Chandra Hendriyani et al. (2020): Researched the use of WhatsApp Business for marketing strategies in the bakery and tourism sectors using descriptive qualitative methods.
   Gap: This study not only describes usage but also includes application development and effectiveness analysis specifically for e-groceries services using design thinking principles.

The argument for the urgency of this research is no longer normative, as it is supported by the latest empirical data specific to the research object (Pasarmu.id) and national market trends:

2. Real Performance Decline of Pasarmu.id: Data shows a 50% decrease in average daily transactions (from 20 orders to 10 orders per day) between July 2022 and June 2023 after the transition to platform version 2.0. This directly decreased revenue, making WhatsApp feature innovation an urgent solution to restore customer retention.

3. National Shopping Behavior Trends: Google Trends data (2022) shows a 90% year-on-year increase in searches for the keyword "vegetables" in the first quarter of 2022.

LITERATURE REVIEW

E-groceries: Business-to-consumer (B2C) e-commerce platforms specializing in online groceries sales with a focus on convenience and doorstep delivery. The sector faces distinct challenges regarding perishable goods management and complex logistics. However, the convenience of avoiding crowded physical markets remains a primary driver for adoption. Defined as a multichannel commerce development that allows the public to obtain processed food ingredients online. Research indicates a significant shift in Indonesian consumer behavior, with a 60% increase in the intent to purchase ingredients online following the pandemic.

The development of Pasarmu.id represents a critical case study in the digital transformation of local e-grocery services in Indonesia. Established in 2020, the platform initially operated on a fragmented system (Platform 1.0) before transitioning to a unified, integrated system (Platform 2.0) in June 2022. While this integration aimed to consolidate web and mobile modules, it inadvertently introduced significant "transaction friction" into the user experience.

Key literature and empirical data regarding Pasarmu.id highlight several critical areas:

1. System Performance and User Retention: The shift to Platform 2.0 resulted in a 50% decrease in average daily transactions, dropping from 20 to 10 orders per day. This decline was attributed to an over-engineered architecture that ignored the "Ambiguity Rule" of design, leading to slow loading times of 1–2 minutes.
2. Organic User Adaptation: Research into Pasarmu.id's user behavior revealed that when faced with technical complexity, customers reverted to "manual behavior," bypassing the automated system to communicate directly via WhatsApp. This observation aligns with the "All Design is Redesign" principle, suggesting that successful innovation must reflect existing social and technical conditions.
3. Target Demographic Needs: The primary users of Pasarmu.id are Gen Y (Millennials) and women (94.29%), who often balance professional and domestic responsibilities. Literature suggests that for this "decision-maker" segment, time-efficiency is more desirable than a feature-rich but complex interface.
4. Technological Feasibility vs. Desirability: The case of Pasarmu.id demonstrates that for MSME-linked e-groceries, "technological feasibility" must be secondary to "user desirability". Integrating a rule-based WhatsApp chatbot serves as a "frictionless" gateway that utilizes a platform already integrated into the daily lives of over 118 million Indonesians.
5. Operational Robustness: Recent studies emphasize the need for "Phonetic Search Robustness" within the Pasarmu.id system to handle human input errors, such as misspellings of local product names (e.g., "Caysim" for "Cesim"), thereby maintaining transaction flow despite user typos.

Design Thinking: A human-centered, iterative, and collaborative approach to creative problem-solving. It integrates three critical criteria:

1. **Desirability (user needs) :** Ensuring the product satisfies emotional and functional user needs.
2. **Feasibility (technological possibility):** Determining technical and resource-based viability.
3. **Viability (business sustainability):** Assessing long-term business sustainability and profitability.

This study synthesizes these theories into a developmental research model by applying the five-stage Design Thinking framework **(Empathize, Define, Ideate, Prototype, and Test)**, the research moves from understanding human kognitive and creative needs to technical implementation. Central to this study is the "All Design is Redesign" rule (Meinel & Leifer, 2015). This principle posits that understanding past solutions—in this case, the success of version 1.0 and the failure of version 2.0—is essential to creating modern innovations that reflect current social and technical conditions.

By applying "Empathize" and "Define" stages, the research synthesizes user pain points (e.g., slow application loading, complex login processes) into specific User Personas and User Journey Maps. The model transitions from qualitative user analysis to technical implementation, positing that a WhatsApp-based service will bridge the gap between traditional market access and modern digital convenience.

While not framed as statistical hypotheses, the model operates on the premise that integrating a WhatsApp Chatbot with a simplified Web Order system will significantly reduce transaction friction and restore daily order volumes that had previously declined. The model posits that the "Desirability" of a service can be enhanced by utilizing a platform already integrated into daily life (WhatsApp), while "Feasibility" is addressed through Rule-Based Chatbots and Web Order APIs. The theoretical framework directs the research toward the conclusion that a simplified, automated chat interface can mitigate the "transaction friction" often found in complex, standalone e-grocery applications.

Whatsapp Business & Chatbots: WhatsApp is identified as a strategic marketing tool with over 118 million users in Indonesia. The research focuses on Rule-Based Chatbots to provide automated FAQ responses, promotional messages, and integrated shopping carts to enhance customer engagement. The WhatsApp Business API provides enterprise-level features including an omnichannel dashboard and CRM integration, allowing for distributed message management across customer service agents. This study implements a rule-based chatbot, which utilizes structured patterns to respond to user inputs. This provides a predictable, reliable interface for the "Web Order" module compared to more volatile AI-driven systems.

The study's novelty is established through a systematic comparison with existing research and its multi-dimensional contributions:

1. Novelty (Gap Analysis):

a) Methodological Shift: Previous studies (e.g., Kosasi, 2015) utilized linear sequential models for e-grocery systems. This research replaces that with a Design Thinking approach to ensure the final product is deeply rooted in user empathy.
b) Platform Integration: Unlike descriptive studies of basic WhatsApp marketing (e.g., Astria, 2021), this study focuses on the technical development of an integrated Chatbot-to-Web-Order system.

2. Systematic Research Contributions:
   c) Scientific: Contributes to the field of "Technology Startups" by providing a framework for design-led innovation in digital enablers.
   d) Social & Economic: Serves as a digital enabler for Micro, Small, and Medium Enterprises (MSMEs/UMKM), specifically supporting government initiatives to monitor regional inflation (TPID) and improve the supply chain for local farmers.

Practical: Offers a scalable model for e-grocery services to improve transaction efficiency and brand trust through direct, automated communication channels

RESEARCH METHODS

The research method used is a software development method with a prototype approach. The prototyping approach is an iterative process that involves a close working relationship between service providers and customers, allowing researchers and users, in this case the public, to better understand the ease of shopping for basic necessities using a WhatsApp-based platform. The steps taken in designing and creating the information system in this study can be broadly divided into three stages:

1. Data collection and needs analysis.
2. Design and development of a WhatsApp-based prototype.
3. Evaluation and testing of the prototype.

However, if the WhatsApp-based platform fails to deliver the desired results, revisions are necessary to return to the WhatsApp business process design phase for e-groceries services.

1. **Research Timeline:**
   The study was conducted over a four-month period, from September to December 2023.
2. **Data Collection Methods:**
   Data was collected using a qualitative approach through in-depth interviews and direct observations of customer behavior on the Pasarmu.id platform.
3. **Population and Sampling:**
   The study targeted a population of 355 regular customers out of a total of 5,353 registered users. A sample of 35 participants was selected for the interviews. The sample size was determined using the Slovin formula with a 20% margin of error, which established a minimum requirement of 23 respondents; the 35 selected participants thus ensured a valid

representation for the study. The selection prioritized customers with the highest transaction volumes to gain deep insights into the challenges faced by the platform's most active users.

This study followed the five iterative phases of Design Thinking:

1. **Empathize:** Conducted interviews and observations with 35 active customers (Sept–Dec 2023) to understand the motivations behind the shift from the automated platform to manual messaging. In this phase, in-depth interviews and observations were conducted with 35 active customers to understand why there was a shift in behavior from using automated platforms back to manual messaging. Researchers found that customers felt burdened by the long loading times on Platform 2.0, which reached 1–2 minutes. This inconvenience prompted customers to manually contact Customer Service via WhatsApp to inquire about product details, bypassing the existing automated system. This research prioritized "human empathy" over rigid technical architecture to understand user frustrations during system changes.
2. **Define:** Synthesized data into Empathy and User Journey Maps. This phase revealed that users felt "overwhelmed" by the consolidated Platform 2.0 system, leading to the identification of complexity as the core problem. The mapping results showed that the integration of systems in Platform 2.0 created a complex sub-module structure, which left users feeling overwhelmed. Significant "transaction friction" was identified, where login difficulties and specific password requirements hindered smooth shopping. This journey analysis is crucial because 94.29% of users are female and 82.86% are Millennials, who prioritize time efficiency over complex features.
3. **Ideate:** Based on the findings from the Define stage, the brainstorming process focused on creating a frictionless transaction environment. Brainstormed the integration of the "Web Order" system into a chat interface, focusing on keyword-based product searching. The solution that emerged was to integrate the "Web Order" system directly into the WhatsApp chat interface that customers are already familiar with. Ideation included developing a keyword-based product search with phonetic search robustness. It was decided to use a rule-based chatbot to provide fast automated responses (such as FAQs and OTP codes) while still providing direct access to human assistance through the Customer Service button.
4. **Prototype:** Developed a rule-based chatbot connected via the WhatsApp Business API, focusing on registration, product catalogs, and automated recovery workflows. Development focused on creating a "Frictionless Gateway" through WhatsApp Business API integration managed via an

omnichannel dashboard, reducing the manual burden on customer service agents.

1. Phonetic Search Robustness: This feature allows the system to identify queries despite phonetic variations or typos. For example, inputting "Caysim" will accurately trigger results for "Cesim," and a key query like "Cabe" will automatically direct users to the relevant product sub-module.
2. Actionable Brevity: Based on the System Integration Test (SIT) results, the chatbot message was trimmed from its initial version (200 words) to less than 100 words. This innovation is crucial to prevent users from scrolling and direct their attention directly to the "Web Order" link.
3. Security Integration: The chatbot acts as a bridge that directs users to the official Pasarmu.id domain for the checkout process. This is crucial to maintain data integrity and ensure users are not trapped by suspicious (scam) links.
5. **Test:** Executed a two-tier evaluation:
4. System Integration Test (SIT): The testing team provides feedback on the extent to which the system meets the functional requirements set out in the development documents. This includes testing various system functions and features to ensure that the prototype meets expectations. Evaluating the integration of interfaces between various components or systems. This includes matching the inputs and outputs processed by the system, as well as testing the interactions between different systems. Feedback also includes evaluating the system's compliance with the previously established design and architecture. This includes testing to ensure that the system is implemented according to established technical specifications. Specifically tested scenarios such as "Registration via WA," "Order Status Checks," and "Phonetic Search Robustness."
5. User Acceptance Test (UAT): Gathered qualitative feedback on the efficiency of the new interface. Test results demonstrate that empathy-based simplification produces significantly superior performance compared to complex standalone systems.

User Acceptance Test (UAT) Results:

2. Access speed increased significantly with transition times of less than 3 seconds, reducing latency by 1-2 minutes on the legacy system.
3. 100% of productive-age users stated that the communicative alternative (chatbot) was far more effective and convenient than the standalone application.
4. The effectiveness of handling transactional tasks (such as OTP and password reset) achieved maximum success rates.

RESULTS & DISCUSSION

Respondent demographic data confirms that primary users are household decision-makers who have a double burden, managing both professional and domestic responsibilities. The demographic profile of the 35 respondents underscores the importance of a simplified interface for a primarily female, Millennial audience:

Table. 1 The demographic profile of the 35 respondents underscores the importance of a simplified interface for a primarily female, Millennial audience

Category	**Grouping**	**Percentage**	**Count**
Gender	Female	94.29%	33
	Male	5.71%	2
Generation	Gen Y (Millennials)	82.86%	29
	Gen X	17.14%	6
Occupation	Housewives	22.86%	8
	Private Employees	22.86%	8
Frequency	3x per month	51.43%	18

User Personas:

1. High Loyalty: A group that highly values quality assurance. They are most sensitive to "interface friction" as it directly erodes the brand trust built since Platform 1.0.
2. Medium Loyalty: Consumers who prioritize speed of product search and competitive price comparison.
3. Low Loyalty: New users who require immediate assistance (live assistance) with minimal registration barriers.

Users in this ecosystem absolutely prioritize time-efficiency over feature-richness. Delayed access is not simply a technical issue, but a trigger for loss of customer loyalty.The demographic data reveals a highly concentrated user base: 94.29% are female and 82.86% are Millennials (Gen Y). Analytically, this suggests that the Pasarmu.id service is not just a general grocery tool but a specialized solution for household "decision-makers" who juggle professional and domestic responsibilities (evidenced by the equal split between housewives and private employees). This specific demographic prioritizes "time-efficiency" over "feature-richness," which explains why the over-engineered Platform 2.0 failed despite its technical advancement. The high loyalty segment is particularly sensitive to "interface friction," indicating that for this core group, any delay in the transaction flow directly correlates to a loss in brand trust.

User Journey Map Analysis (Problem Identification)

Several critical issues were identified with the legacy platform:

1. Slow Performance: Customers had to wait 1-2 minutes just to access the main page of the application/website.

2. Rigid Search Feature: The system required very precise keyword typing (e.g., "Cesim" instead of "Caysim").
3. System Failure: The "Forgot Password" feature frequently failed to send the OTP code via SMS.
4. Disconnected Communication: Customers had to exit the application to inquire about product details with customer service.

Table. 2 User Journey Map Analysis (Problem Identification)

Thematic Category	**User Pain Point (Empathy/Define)**	**Design Solution (Ideate/Prototype)**	**Validation Result (Test/UAT)**
Transaction Friction	Platform 2.0 was perceived as confusing and slow (1-2 min loading).	Integration of a "Web Order" link within a rule-based WhatsApp Chatbot.	Transition time reduced to less than 3 seconds; 50% transaction drop addressed.
Communication Gap	Users reverted to manual messaging to ask about product details.	Rule-based chatbot providing automated FAQs and direct CS buttons.	100% productive age users found the communicative alternative more effective than standalone apps.
Input Error Sensitivity	Complex login and specific keyword requirements in the old system.	Implementation of "Phonetic Search Robustness" for product queries.	Successful identification of items despite typos (e.g., "Caysim" for "Cesim").

Solution Innovation: Web Order & WhatsApp Chatbot

Based on the Ideate stage, the following solutions were developed:

1. New Web Order: Designed to be lighter and more responsive to address slow loading issues.
2. WhatsApp Chatbot: Serves as an instant gateway that sends order links directly to customers' mobile phones.
3. Customer Service Integration: Adding a "WhatsApp Chat" button directly to the web order page for real-time product consultations.

The success of the WhatsApp integration confirms the "All Design is Redesign" rule; by observing that users were already manually reverting to WhatsApp, the prototype simply digitized an existing organic behavior. The preference for rule-based chatbots over complex AI at this stage is theoretically grounded in "Desirability" and "Feasibility"—users required a predictable, scam-free interface that utilized the official Pasarmu.id domain to maintain trust. Furthermore, the SIT results regarding message length (under 100 words) highlight a cognitive preference for "actionable brevity" in mobile commerce. In summary, the resource concludes that the WhatsApp chatbot is an effective tool for **improving the user experience** by providing a lightweight, fast, and communicative alternative to traditional mobile applications.

CONCLUSIONS AND RECOMMENDATIONS

The Design Thinking approach has successfully bridged the usability gap that previously crippled Pasarmu.id's operations. This research demonstrates that for e-grocery services connected to MSMEs, "User Desirability" must always be prioritized over excessive "Technological Feasibility." The conclusion regarding customer response to the **WhatsApp chatbot** integrated with the Pasarmu.id e-grocery service is generally **positive**, particularly concerning its speed and its ability to bridge communication gaps. The following conclusions can be drawn about customer interaction and feedback regarding the WhatsApp chatbot:

1. **Fast and Efficient Access:** During the User Acceptance Test (UAT), customers reported that using the chatbot to access the web order link was highly efficient, with the transition taking **less than 3 seconds**. This directly addressed previous complaints about the slow loading times (1–2 minutes) of the original application and web platform.
2. **Preferred Communication Channel:** Even before the formal chatbot implementation, many customers had already shifted to ordering manually via WhatsApp because the previous platform (Pasarmu.id 2.0) was perceived as confusing. Customers explicitly requested **chat features** to be embedded within the ordering process so they could ask about product details without leaving the interface.
3. **Effective for Transactional Tasks:** The chatbot proved successful in handling specific transactional needs, such as **delivering OTP codes** for account verification and password resets. It also provided a reliable bridge for customers to connect directly with Customer Service (CS) via a dedicated "Chat via WhatsApp" button on the web order page.
4. **Need for Concise Information:** Initial feedback from System Integration Testing (SIT) suggested that customers prefer **short, actionable messages**. Early versions of the chatbot sent messages that were too long (200 words), and the conclusion was that messages should stay **under 100 words** to prevent users from having to scroll to find the order link.
5. **Familiarity and Trust:** The use of a Rule-Based Chatbot was deemed appropriate because it utilized an **ordering flow familiar to customers**. However, to maintain user trust and avoid being mistaken for "scam" links, it was concluded that the links provided by the chatbot must clearly refer to the official Pasarmu.id domain.

The transition to Platform 2.0 failed because it ignored the Ambiguity Rule; the system was over-engineered for a demographic that prioritizes speed. By acknowledging that "all design is redesign," we looked at the manual behavior of users reverting to WhatsApp. This allowed us to build a digital version of that manual process, reducing ambiguity through a familiar chat-based interface. A critical success of the prototype was its ability to handle "human" input errors. During SIT/UAT, the search functionality successfully identified keywords even with common typos or phonetic variations. For example, searches for "Caysim" correctly yielded results for "Cesim," and keyword queries for "Cabe" (chili) consistently triggered the correct product sub-modules. The rule-based chatbot, managed via the omnichannel dashboard, significantly reduced the

manual burden on customer service. UAT results confirmed that the transition from WhatsApp browsing to the "Web Order" checkout was perceived as seamless, effectively bridging the gap between chat familiarity and e-commerce efficiency.

This research concludes that the application of a Design Thinking approach successfully bridged the usability gap that caused a 50% decline in Pasarmu.id's daily transactions. By prioritizing human empathy over rigid technical architecture, the study identified that the target demographic—predominantly Millennial women and housewives—values speed and familiarity over complex sub-module structures.

The systematic mapping of user needs to design features demonstrates that a WhatsApp-based service acts as a "frictionless" gateway. The implementation of a rule-based chatbot successfully reduced loading times from minutes to seconds and mitigated the "transaction friction" inherent in standalone applications. Analytically, the study shows that for MSME-linked e-groceries, "technological feasibility" must be secondary to "user desirability," utilizing platforms like WhatsApp that are already integrated into the daily lives of over 118 million Indonesians.

FURTHER STUDY

While current rule-based systems are highly robust for transactional needs, they still face latency challenges for complex and ambiguous queries. Integrating Natural Language Processing (NLP) is recommended in the next phase of development. NLP integration will enable the system to respond more flexibly to natural language while addressing the limitations of complex queries, which currently pose a technical barrier.

ACKNOWLEDGMENT

The author sincerely extends gratitude to supervisors, development team members, respondents, and supporting institutions whose guidance, collaboration, and valuable feedback greatly contributed to the successful completion of this study.

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