ICMSNSC

Proceeding of the International Conference on Mathematical Sciences, Natural Sciences, and Computing

E-ISSN: XXXX-XXXX
P-ISSN: XXXX-XXXX

Designing an On-Demand Printing Service Platform: Validating a User-Centered Interface to Empower MSMEs in the Instant Economy Era

Elvan Putra Pratama Ramanovanda[1]*, Yoga Putra Pratama[2]

[1] Politeknik Negeri Jakarta; e-mail : elvanramanovanda02@gmail.com
[2] Politeknik Negeri Jakarta; e-mail : yoga.putra.pratama@grafika.pnj.ac.id
* Corresponding Author : Elvan Putra Pratama Ramanovanda

Abstract: The on-demand economy has transformed consumer expectations, demanding fast, transparent, and efficient services. However, the MSME printing sector in Indonesia is often still hampered by manual processes that cannot meet these demands. This research aims to design and validate an on-demand printing service platform interface that acts as a digital bridge between customer demand and MSME production capacity. Using a User-Centered Design (UCD) methodology, a high-fidelity interactive prototype was designed and validated through usability testing with 20 respondents. The test results demonstrated excellent usability, with an average task completion rate of 93%, an overall relative efficiency of 91.4%, and a user satisfaction score of 88%. These results validate that the platform design focusing on instant ordering flows, real-time price calculation, and a job management dashboard for service providers successfully creates an effective and satisfying user experience. The implication of this research is a validated platform model that can serve as a catalyst for printing MSMEs to adapt to the on-demand economy, increase their competitiveness, and participate in the broader digital ecosystem.

Keywords: on-demand service, MSMEs, interface design, user-centered design, marketplace, usability testing, printing industry.

1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) are a fundamental pillar of the Indonesian economy, contributing significantly to the national Gross Domestic Product (GDP) at around 61% (Suhayati, 2023; Kadin Indonesia, 2023) and employing up to 97% of the total workforce (Kadin Indonesia, 2023; Jannah & Putra, 2023). MSMEs not only serve as drivers of the people's economy but also as the backbone of national economic resilience, particularly in times of crisis. However, in the face of changing consumer patterns moving toward digitalization and instant services, many SMEs, particularly in the service sector such as printing, are struggling to adapt systematically. The shift in consumer preferences toward fast, flexible, and transparent services creates new pressures requiring innovative and responsive solutions (Hidayah, 2023; Sitompul et al., 2025).

Significant changes toward an on-demand economy, which prioritizes service speed and ease of access, have disrupted traditional SME operational systems. Conventional business models that still rely on manual processes and are often unstandardized create friction in service fulfillment processes (Komdigi, 2024; Sari & Zahiroh, 2023). These limitations pose a major obstacle in meeting the expectations of the digital market, which demands efficiency and accuracy in every transaction. In the printing sector, delays in processing, price uncertainty, and lack of service transparency are the main challenges in maintaining competitiveness in the digital economy era.

The COVID-19 pandemic has accelerated the transition toward mass digitalization, making technology adoption no longer an option but a necessity for businesses to survive (Hidayah, 2023; UMN, 2021). The printing industry, which has traditionally relied on direct interaction and physical production processes, has experienced significant disruption due to changes in consumer behavior and social restrictions. This has made digitalization an urgent

Received: date
Revised: date
Accepted: date
Published: date
Curr. Ver.: date

necessity for printing SMEs to survive and even grow amid uncertainty. Inability to adapt to online service systems can lead to customer loss and a drastic decline in production capacity (Renanto, 2021).

The challenges faced by the printing industry are not only technical digitalization aspects but also the ability to provide on-demand services (BPS Polewali Mandar, 2023; Wiweko & Anggara, 2025). Today's customers demand quick ordering, instantly customizable services, and real-time progress tracking systems. Printing SMEs, most of which lack adequate digital infrastructure, are under pressure to radically transform their business models. Therefore, an innovative approach is needed to design a service system that can address these challenges comprehensively and with a long-term orientation.

This design project originated from a case study of two local printing companies struggling to keep up with the trend of on-demand digital services. Based on the identified issues, a vision was developed to design a national-scale solution in the form of an on-demand printing service platform. This platform is designed as an aggregator and facilitator connecting printing service requests from across Indonesia with the nearest and most suitable printing SME production capacity. This idea not only addresses market needs but also supports the government's agenda to digitize 30 million SMEs (Ministry of Cooperatives and SMEs of the Republic of Indonesia, 2024; Permadi & Mayasari, 2024), with a specific focus on empowering SMEs in the printing services sector to compete in the instant economy (Ministry of Economy of the Republic of Indonesia, 2021).

The platform is designed based on user-centered design principles to ensure that the interface and service flow are understandable and can be used effectively by users from various backgrounds. This approach not only enhances user comfort and satisfaction but also drives increased productivity and efficiency from the SME operators' perspective. By integrating user needs into the design process, the platform is expected to create a seamless, adaptive, and responsive service experience tailored to the dynamics of the digital market (Interaction Design Foundation, 2023; Firmbee, 2023).

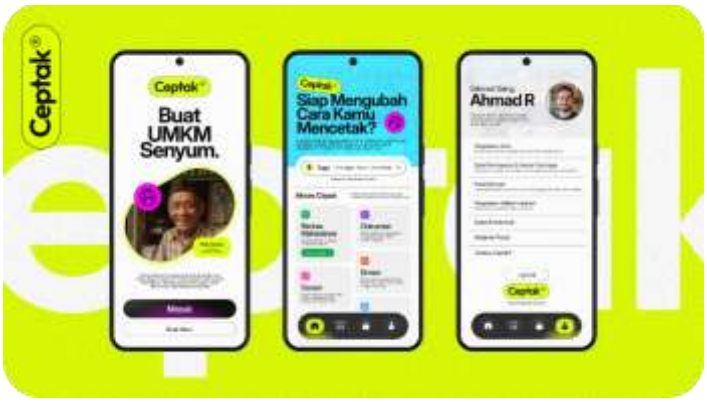

Figure 1. View of the Self-Service Kiosk Prototype Interface

User-centered interface validation is a central aspect of this platform's development. An intuitive, accessible interface that supports efficient transaction processes will determine the extent to which this platform is accepted by MSMEs and customers at large. Therefore, the validation process is carried out iteratively, involving users from the early stages of design to the final product testing. This approach also ensures that the system design truly addresses real needs, not just technical assumptions or design alone (Maze.co, 2023; Baymard Institute, 2023).

Based on this background, the research question is: how can a user-centered design of an on-demand service platform effectively bridge the gap between modern customer expectations and the operational capabilities of printing SMEs, thereby creating an efficient, transparent, and scalable service ecosystem? The answer to this question is expected to contribute theoretically and practically to the development of inclusive digital platforms and strengthen the competitiveness of Indonesian printing SMEs amid the increasingly dynamic global economic pressures.

2. Preliminaries or Related Work or Literature Review

2.1 MSMEs and the Challenges of Digital Transformation

Micro, small, and medium enterprises (MSMEs) play an important role in Indonesia's economic structure, particularly due to their contribution to the national GDP and their ability to absorb labor on a large scale. However, entering the digital economy era characterized by instant services, MSMEs face major challenges in adapting to the rapidly changing market dynamics. Digital transformation has become an urgent necessity for SMEs to remain relevant and competitive amid the pressures of globalization and changing consumer behavior (Suhayati, 2023; Kadin Indonesia, 2023). This transformation not only requires the integration of technology into business processes but also a deep understanding of the evolving digital ecosystem, including mastery of online distribution channels, automated transaction systems, and platform-based services.

SMEs often face constraints due to limited access to technology, insufficient digital literacy, and inadequate support in terms of infrastructure and human resources. As a result, although digitalization has proven to increase efficiency and market reach, its adoption remains uneven among SME operators, particularly in service sectors such as printing (Sitompul et al., 2025; Wiweko & Anggara, 2025). This challenge is exacerbated by the COVID-19 pandemic, which has drastically accelerated the shift toward digital transactions, forcing businesses to quickly adopt technology as part of their service processes (Hidayah, 2023; UMN, 2021). Therefore, efforts to digitally transform SMEs must be designed in a structured and inclusive manner, providing space for innovation and adequate technological support.

2.2 The On-Demand Economy and Changing Consumer Expectations

The on-demand economy phenomenon has fundamentally changed consumer expectations regarding services and products. Consumers now demand quick access, flexible services, transparent pricing, and real-time tracking systems. Conventional service models that are not integrated and manual are no longer sufficient to meet these demands (Komdigi, 2024; BPS Polewali Mandar, 2023). In the printing sector, this shift is evident in the growing demand for on-demand printing services, online file uploads, and automated contactless delivery. The unstandardized operational systems of small and medium-sized printing businesses, which still rely on direct communication, pose a barrier to meeting the demands of the instant economy (Sari & Zahiroh, 2023; Renanto, 2021).

With the pressure to adopt faster and more responsive business models, on-demand service platforms have emerged as a potential solution. These platforms enable digital service integration and create new distribution channels between customers and service providers, while simplifying transaction and ordering processes (Wiweko & Anggara, 2025; Permadi & Mayasari, 2024). However, the success of these platforms heavily depends on their ability to understand and adapt to user needs in real-time. User interface design and user experience (UX) become vital components in bridging the expectations of modern consumers with the evolving capabilities of local SMEs.

2.3 User-Centered Design Approach in Digital Interface Validation

User-Centered Design (UCD) is an approach to digital product design that places the user at the center of every stage of the development process, from identifying needs to testing the final product. This approach aims to ensure that the system built is truly usable, relevant, and contextually appropriate for real-world use (Interaction Design Foundation, 2023; Firmbee, 2023). In the context of on-demand printing services, UCD provides a systematic framework for identifying user frustration points, formulating personas, and developing interface prototypes that can be validated iteratively. This is important because SMEs often have limitations in adapting to technology, so the design must be tailored to their capabilities and preferences.

UCD-based interface validation is conducted by directly involving users in prototype testing to measure the effectiveness, efficiency, and satisfaction of system usage. Testing can be conducted using methods such as Moderated Remote Usability Testing, where participants perform real tasks within the prototype, and the results are analyzed both quantitatively and qualitatively (Maze.co, 2023; Hostinger, 2023). The validation results from this study show that the designed interface achieved a high satisfaction score of 88%, with effectiveness and efficiency each exceeding 90%. These findings demonstrate that the UCD approach not only enhances the usability of the system but also contributes to increasing SME participation in a larger and more competitive digital ecosystem.

3. Proposed Method

This study uses a User-Centered Design (UCD) approach to ensure that the platform solution designed is truly relevant and can be used effectively by the target users. The UCD approach places user needs, behaviors, and limitations at the center of each stage of the iterative design process (Interaction Design Foundation, 2023; Firmbee, 2023). The research process consists of several main phases, beginning with the research and empathy phase aimed at deeply understanding the problem context through literature reviews and direct observations of printing customers. Semi-structured interviews were also conducted to accurately identify user needs and pain points.

The definition and ideation phase was conducted to explicitly formulate the core problem in the form of a problem statement, which then became the basis for brainstorming sessions. From the brainstorming results, various innovative and relevant design solution concepts were generated. The most promising concept was then developed into a low-fidelity prototype to test the basic flow and interaction structure. After refinement, the prototype was developed into a high-fidelity interactive prototype that mimics the final product and is ready for further testing by users.

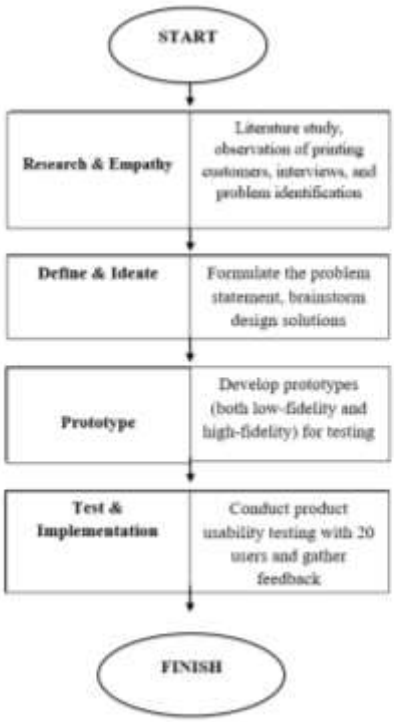

Figure 2: Research Flow

During the testing and implementation phase, usability testing was conducted to validate the quality of the design. This testing involved 20 relevant respondents, in order to measure the effectiveness, efficiency, and user satisfaction with the platform. The data collected through these testing sessions were analyzed qualitatively and quantitatively and served as the basis for evaluating and refining the platform design. The user research method used in this study was contextual inquiry, which involves direct observation and semi-structured interviews conducted in the users' natural work environment (Interaction Design Foundation, 2025; Nulab, 2022). The aim is to uncover tacit knowledge that is often not explicitly articulated (Wikipedia, 2025; Dovetail, 2025).

The data obtained from this stage is then used to build representative user personas (Shopify Blog, 2025; Hotjar, 2025). These personas serve as a reference for developing platform features by remapping user frustration points. The prototyping process is conducted using Figma software, which enables the creation of high-fidelity prototypes to simulate workflow and the final product interface (The Product Manager, 2024; Interaction Design Foundation, 2025). To validate the design, moderated remote usability testing was conducted (Hostinger, 2023; UserWay, 2024). Participants were given realistic tasks to complete using the provided digital prototype to directly assess the system's usability performance.

Effectiveness in testing was measured using the completion rate, which is the percentage of tasks successfully completed by users. Efficiency was calculated using Overall Relative Efficiency, which compares the time taken by users who successfully completed the task with the total time spent by all users. User satisfaction was measured using the Questionnaire for User Interface Satisfaction (QUIS) and analyzed using a feasibility formula to obtain a satisfaction score in the form of a percentage.

After obtaining the average value for each indicator, the data was analyzed using a feasibility formula to interpret the test results on a quantitative scale. The assessment categories are grouped into five classifications: very poor (0–20%), poor (21–40%), fair (41–60%), good (61–80%), and very good (81–100%). These measurement results provide a comprehensive understanding of the platform interface's performance from the user's perspective. Through this method, the validity of the design can be tested objectively and iteratively, while also providing a scientific basis for subsequent design decisions.

4. Results and Discussion

4.1 Digital Transformation of MSMEs in the On-Demand Economic Landscape

Positive test results validate that specifically designed features successfully address existing problems in the context of instant services.

1. Gap Analysis

From the customer's perspective, the main issues include slow and uncertain ordering processes, lack of price transparency, and poor communication regarding work progress (Techosquare, 2012; M. A. F. A. et al., 2024; Ordant.com, 2025). From the SME perspective, the main challenges are difficulty in reaching new customers, efficiently managing work queues, and providing quick time and cost estimates (M. A. F. A. et al., 2024; Momnet.com, 2025; Managedprint.com, 2025).

As a solution, a platform was designed to function as a service aggregator. This platform does not display a static product catalog but rather a smart order form as the main entry point. Customers enter their printing specifications, and the platform automatically matches them with available and suitable SME service providers. The chosen monetization model is transaction-based commission, aligning the platform's interests with the success of SMEs (Meetmarkko.com, 2025; McFadyen Digital, 2024).

2. Persona Development

Data collected from contextual inquiry and enriched with analysis from secondary sources is then synthesized to build user personas. Personas are fictional, archetypal representations of primary user segments, designed to help the design team stay focused on user needs throughout the design process. These personas include demographics, goals, motivations, and pain points, giving a human face to the research data. Two main sets of personas were developed for this platform: customer personas and vendor personas.

Figure 3. Customer Persona

Figure 4. Vendor Persona

3. Frustration Point Identification and Ideation

Here are the frustration points as well as problem statements found from persona development. Once the problem and users are clearly defined, the ideation phase begins. Structured brainstorming sessions, such as using the "How Might We..." framework, will be used to generate various feature and solution ideas. Each idea that emerges will be explicitly mapped back to the frustration points and goals of each persona that has been developed, to ensure the relevance of the solution.

Table 1. Frustration Points and Interface Features based on Ideation

Frustration Point / Gap	Proposed UI/UX Features Based on Ideation
Slow and uncertain ordering process.	Guided One-Page Ordering Flow with Real-Time Price Calculator.
Poor design file quality causes delays.	File Upload Interface with Automated Pre-Print Check.
Uncertainty about order progress status.	Customer Dashboard with Real-Time Job Status Tracking (Received > In Production > Completed > Shipped).
MSMEs struggle to manage job queues.	Service Provider (Vendor) Dashboard with Kanban View for Job Management (New Jobs > In Progress > Completed).
Inefficient communication between customers and service providers.	Integrated Instant Messaging Feature on Each Job Detail Page.

The process of identifying user frustration points is a crucial early stage in a user-centered design approach. Based on the persona development, a number of key barriers were clearly mapped from the perspective of end-users, both customers and printing MSMEs. These include a slow and uncertain ordering process, design file quality that does not meet printing standards, and a lack of transparency on the status of order processing. From the MSME side, challenges arise in the form of difficulties managing work queues efficiently and poor communication with customers. All of these frustrations then became a strong foundation to enter into a systematic ideation stage, with the main focus of producing solutions that directly address these needs.

The ideation stage was conducted using a structured brainstorming approach using the "How Might We..." framework to trigger the exploration of creative and relevant solutions. Each idea that emerged was evaluated based on its relevance to the previously developed persona goals and frustrations. In this way, feature development is not merely technical, but truly contextualized and based on real user needs. This approach ensures that the interface features designed are not only technologically innovative, but also have practical utility in addressing real problems encountered in the on-demand print service process.

Several key features were then designed as a direct result of mapping out these frustrations. For example, to address the issue of slow and uncertain ordering, a guided one-page ordering flow was developed that comes with a real-time automated price calculator. The problem of delays due to poor design files was addressed through a file upload interface equipped with an automated pre-print check system. The need for transparency in order progress is addressed through a customer dashboard that features real-time tracking of work status (received > in production > finished > shipped). All these features are designed to minimize uncertainty and increase user control over their orders.

From the side of printing MSME players, solutions are also presented to support work efficiency. The challenge of managing work queues is addressed through a vendor dashboard that carries a Kanban-style appearance, making it easy to track and share job status (new job > in process > completed). To bridge the often ineffective communication between customers and service providers, an instant messaging feature is integrated on every job detail page. With a combination of a systematic design approach and a direct link between user frustrations and interface solutions, the design of this platform is expected to improve the efficiency, convenience, and satisfaction of all stakeholders in the on-demand printing service ecosystem.

4. Information Architecture and Navigation

The information architecture of the platform is designed with the main purpose of making it easier for users to find the information and services they need quickly and intuitively, while minimizing cognitive load and reducing potential confusion in navigation. The information structure of the system is divided into four main components that complement each other. The first is the Customer-Facing Storefront, a public page that serves as a starting point for customers to explore various services, view product catalogs, and make direct transactions. Second, the Customer Account Dashboard, a personalized space where users can manage their profile information, track the status of ongoing orders, and access their transaction history. Third is the Vendor-Facing Dashboard, which is a control center for MSME players to manage their stores, including product settings, order processing, and financial records. The fourth is the Admin Panel, which although designed for the advanced stage of development, will be the interface for platform managers to manage all operational aspects, such as users, vendors, transactions, and overall site content.

The navigation design of the platform emphasizes a clear and structured hierarchy of information so that users do not feel lost while exploring the service. One of the key features in the navigation is the presence of a search bar that is always visible and can be easily accessed from various pages. This search bar is enhanced with advanced filtering functions, such as filters based on price, vendor location, user rating, service type, and estimated processing time. This combination of search and filters is expected to increase efficiency in the process of finding the services that users need. In addition, all product and service categories will be classified in a logical and intuitive manner, such as into groups like "Print Documents," "Promotional Materials," "Merchandise," and "Large Format Print." These groupings aim to support structured browsing and speed up the user's decision-making process in selecting the print service that best suits their needs.

4.2 Usability Testing Results

Usability testing of the interactive prototype produced very positive quantitative data, indicating that the platform design achieved a high level of usability in all three aspects of measurement.

1. Effectiveness

Effectiveness The average Completion Rate of the 10 tasks given to 20 respondents reached 93%. This figure shows that the majority of users were able to complete the main workflow of ordering an on-demand service (from requirement specification, file upload, to order confirmation) successfully and independently. This indicates that the designed order flow is highly effective.

Table 2. Effectiveness Results using Completion Rate

Respondent Code	Tasks Completed	Total Tasks	Percentage
R1	10	10	100%
R2	9	10	90%
R3	9	10	90%
R4	9	10	90%
R5	10	10	100%
R6	9	10	90%
R7	9	10	90%
R8	10	10	100%
R9	9	10	90%
R10	9	10	90%

Based on this data, researchers get a completion rate of 93% using the effectiveness calculation formula as follows:

$$\boldsymbol{Effectiveness = \frac{Number\ of\ tasks\ successfully\ completed}{Total\ number\ of\ tasks} \times 100\%}$$

$$\boldsymbol{Effectiveness = \frac{93}{100} \times 100\% = 93\%}$$

2. Efficiency

The average Overall Relative Efficiency was recorded at 91.4%. This high efficiency score proves that users are able to complete ordering tasks quickly, a crucial factor in the

context of on-demand services. The interface design that minimizes steps and provides clear information directly contributes to this efficiency. The following is the result of calculating the Overall Relative Efficiency of a task scenario by one of the respondents (Respondent 4, R4):

$$\frac{(1\times 7)+(1\times 14)+(1\times 5)+(1\times 6)+(0\times 12)+(1\times 9)+(1\times 6)+(1\times 9)+(1\times 9)+(1\times 6)}{7+14+5+6+12+9+6+9+9+6}\times 100\%$$

$$\frac{71}{83}\times 100\% = 86\%$$

Based on the calculation of Overall Relative Efficiency, it can be concluded that respondent R6 scored 86% in the efficiency of completing the task/task scenario. The complete efficiency calculation results are presented in the following table.

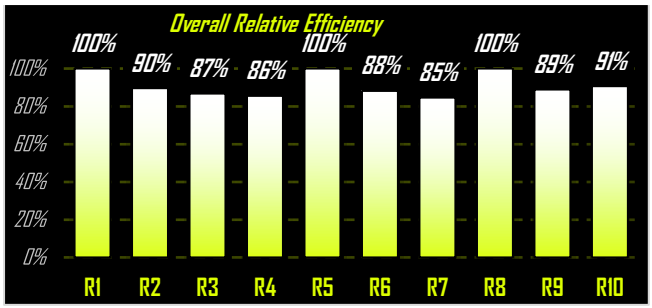

Figure 3. Overall Relative Efficiency Bar Graph

3. Satisfaction

Analysis of the QUIS questionnaire resulted in a user satisfaction feasibility score of 88.00%. Based on the interpretation scale, this score falls into the "Excellent" category. This shows that users are satisfied and confident with the transparent and fast ordering process.

Table 3. Customer Satisfaction Results using QUIS

Description	Response Score
Strongly Agree	200
Agree	204
Neutral	36
Disagree	0
Strongly Disagree	0
Total	**440**

After the scores for each indicator were collected, the researcher calculated using the eligibility formula. The following is the calculation of user satisfaction using:

$$\boldsymbol{Feasibility} = \frac{\boldsymbol{F}}{\boldsymbol{N}\times\boldsymbol{I}\times\boldsymbol{R}}\times 100\%$$

$$\boldsymbol{Feasibility} = \frac{\boldsymbol{440}}{\boldsymbol{5}\times\boldsymbol{5}\times\boldsymbol{20}}\times 100\%$$

$$\boldsymbol{Feasibility} = \frac{\boldsymbol{440}}{\boldsymbol{500}}\times 100\% = 88\%$$

This feasibility score of 88% quantitatively places the level of user satisfaction in the “Very Good” category according to the interpretation scale used in the study. This means that users are highly satisfied with the platform's interface design, especially in the aspects of ease of ordering, speed of system response, and transparency of information provided. This high level of satisfaction also reflects users' trust in the platform, both in terms of functionality and the dominant user experience. These results strengthen the validity of the interface design that has been developed and provide a strong foundation for continuing the platform implementation process on a wider scale.

4.3 User-Centered Design-Based User Interface Validation of Printing Service Platform

User interface validation was conducted using a User-Centered Design (UCD) approach to ensure that the design of the on-demand printing service platform truly addresses the needs and expectations of users, especially customers and MSME actors. The validation process was conducted through usability testing of a high-fidelity interactive prototype developed on the basis of user frustration mapping and previously established personas (Interaction Design Foundation, 2025; Firmbee.com, 2025; Shopify Blog, 2025). The test results show that the designed key features, such as guided order flow, file upload, automatic price calculation, order status tracking, as well as real-time order management are able to provide an intuitive and efficient usage experience. The prototype was tested through the Moderated Remote Usability Testing method on 20 respondents who were customers of two printing MSMEs that were the object of the initial study (Hostinger, 2023; UserWay, 2024).

From the effectiveness aspect, the test shows that the completion rate achieved is at an average of 93%, indicating that the majority of respondents can complete all tasks correctly and without significant difficulty. This means that the designed interface flow has successfully led users to complete the ordering process independently without any technical barriers or confusion in navigation. This result shows that the principle of user-centered design was successfully applied in a concrete way in the context of a digital platform for printing services (Interaction Design Foundation, 2025). This high effectiveness also reinforces the assumption that with the right design approach, MSMEs and their customers can adapt to digital systems without requiring complex additional training.

Usage efficiency is measured using the Overall Relative Efficiency metric, which shows an average efficiency of 91.4%, with the lowest score achieved by R4 respondents at 86% (Universitas Multimedia Nusantara, 2021). This measurement is done by comparing the task completion time between users who successfully complete with the overall time used. This efficiency result indicates that the time required by users is relatively fast and optimal, reflecting a simple, minimal obstacle, and responsive workflow. This shows that the designed interface is able to simplify the digital interaction process and support user needs in an on-demand service system that demands speed and convenience (Polewali Mandar Regency Statistics Agency, 2023).

In the satisfaction aspect, the measurement results using the QUIS questionnaire show a feasibility score of 88%, which falls into the "Very Good" category according to the interpretation scale used. The total number of scores obtained was 440, consisting of 200 "Strongly Agree", 204 "Agree", and 36 "Neutral" responses, with no 'Disagree' or "Strongly Disagree" responses. Feasibility calculations are carried out using the formula Feasibility = F / (N × I × R) × 100% with a final result of 88.00% (Universitas Multimedia Nusantara, 2021). This result indicates that the majority of users are satisfied with the interface design, both in terms of visuals, ease of use, and clarity of the interaction flow offered. This high level of satisfaction confirms the success of the UCD approach in creating a user experience that is not only functional, but also comfortable and trustworthy (Hostinger, 2023; UserWay, 2024).

5. Conclusions

The design of an on-demand printing service platform with a user-centered interface approach has successfully answered the digitalization challenges faced by MSMEs amid the demands of the instant economy. Through the application of the User-Centered Design method that involves an iterative process starting from field observation, persona creation, prototyping, to usability testing, the platform developed is able to provide an effective, efficient, and satisfying usage experience. Validation conducted on 20 respondents showed an effectiveness rate of 93%, efficiency of 91.4%, and a user satisfaction score of 88%, which falls into the "Very Good" category. These results indicate that the interface design is not only functional, but also capable of empowering printing MSMEs to actively engage in the digital service ecosystem in a competitive and sustainable manner.

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