Usability Evaluation and Interface Design Improvements Recommendations for Self-Service System of a Help Center in an E-commerce Mobile Application

Agri Fina[1], Harry Budi Santoso[2]

agri.fina@ui.ac.id[1], harrybs@cs.ui.ac.id[2]
[1,2] Faculty of Computer Science, Universitas Indonesia

Article Information	Abstract
	Self-service has been widely adopted by various companies worldwide for different purposes; for example, in customer service settings, it automates repetitive and simpler tasks handled by agents. However, self-service systems for resolving customer issues have limitations. This study thus aims to evaluate the usability of the self-service system on the help center of an e-commerce app. Usability evaluation was conducted using both qualitative and quantitative methods. Quantitative data were collected through a survey with demographic and introductory questions, the System Usability Scale (SUS) questionnaire, and follow-up questions. In total, 200 responses were collected (195 of which were valid). Since the average SUS score was 67.35, the data analysis revealed that the self-service system has usability issues, particularly in learnability and efficiency. Additionally, usability testing and in-depth interviews were conducted with 12 participants to collect qualitative data to be analyzed using thematic analysis. Based on these findings, the study concludes that the development team can prepare a plan to enhance the user interface of the self-service system on E-Commerce XYZ's help center to enhance usability.

A. Introduction

E-commerce has become an essential consumer platform in Indonesia and has a growing userbase: From 2020 to 2024, e-commerce users grew by approximately 70%, from 38.72 million to 65.65 million [1]. E-commerce involves business transactions in distribution, purchasing, selling, and service provision via computer networks, particularly Internet-based ones [2]. Customer service is vital for e-commerce, but agents cannot be available 24/7, so self-service systems are used to automate repetitive tasks.

A Deloitte survey [3] showed that self-service systems receive the highest investment (73%) compared to other customer service channels. Increased self-service adoption reflects companies' efforts to enhance efficiency and customer satisfaction. According to Microsoft [4], 79% of respondents found the responses they needed using self-service portals, indicating that customers can utilize effective self-service. Finally, Meuter et al. [5] describe self-service technology as empowering consumers to create and engage in services independently, and key indicators of self-service technology include ease of use, usability, time, and self-control.

Despite increased self-service options, customer needs remain unmet [6]. Notably, only 24% of users preferred solutions that required no agent interaction [6]. Based on a survey by Microsoft, the main issue users encounter with self-service is insufficient information (43%) [7]. To address this issue, [8] recommends enhancing customer self-service design by understanding users, simplifying navigation, presenting relevant content, using clear language, guiding users, making interfaces visually appealing, personalizing experiences, ensuring quick readability, considering mobile experiences, maintaining brand consistency, and humanizing the service team. Since users were found to contact customer service due to user experience failures (which occur in 64% of moderately complex user journeys) [9], organizations must understand user journeys across channels and design supportive user interfaces. Diary studies [9] revealed the four main reasons users contact companies: unmet service expectations, barriers in chosen channels, missing or confusing information, and perceived task complexity.

Understanding and designing for user journeys involves analyzing features across channels to observe how users interact and complete tasks and developing consistent cross-channel solutions. This holistic approach can enhance user experience (UX) and operational efficiency in self-service systems [9]. User-centered design (UCD) focuses on user needs throughout the design process, ensuring the final product meets those needs [10, 11]. The four phases of UCD are (1) understanding the context of use, (2) identifying user needs, (3) developing design solutions, and (4) evaluation. A human-centered approach that emphasizes solving root problems and implementing simple interventions has been proposed for UCD [12].

E-Commerce XYZ, a major Indonesian e-commerce company, has implemented a self-service system on its help center page to improve efficiency and customer satisfaction. Internal data from September 2023 showed that the self-service system resolved about 72% of issues, yet 70% of customers still preferred direct communication with customer service agents, especially for complex problems [13]. The help center and resolution center have different

access paths, confusing customers about where to report issues. This gap in use and preferences indicates that the self-service help center system has not met its target for issue resolution, impacting operational efficiency and customer satisfaction. This research aims to improve user issue resolution via the self-service system to reduce operational costs and increase customer satisfaction. E-Commerce XYZ must continuously update its help center content and features to stay relevant and meet customer expectations. Focusing on usability can identify areas for improvement, such as making information easy to find and navigation intuitive. Accordingly, the research questions for this study are:

RQ1. What are the usability evaluation results for E-Commerce XYZ's self-service help center system?

RQ2. How should the interface design of E-Commerce XYZ's self-service help center and resolution center pages be improved?

This research benefits three main groups: the company, customers, and academia. This work will first identify usability issues in the company's self-service system, providing it with insights for improvements to enhance UX and reduce operational costs. Second, the study will offer customers a better self-service experience, reducing the time needed to resolve issues and increasing satisfaction. Finally, the research will contribute to interface design and usability knowledge by detailing a real-world application of UCD and usability evaluation.

The research focuses on evaluating the usability of the self-service system on the help center of E-Commerce XYZ's mobile app, with the following scope. **Research object**: The self-service system on the help center page of the E-Commerce XYZ mobile app. **Research focus**: Solutions related to transaction issues are provided on the help center page. **Research objective**: To evaluate the usability of the provided self-service system, ensuring ease and efficiency for users in resolving their issues. **Research method**: A combination of quantitative and qualitative methods, using quantitative data from a large number of participants for representativeness and qualitative data from fewer participants for in-depth insights.

B. Research Methods

This case study focused on the self-service help center system of an e-commerce platform in Indonesia and utilized both qualitative and quantitative methods (i.e., a mixed-methods approach). The research design consisted of 12 steps: (1) identifying the research problem, (2) reviewing the literature, (3) determining the research methodology, (4) selecting and preparing the research instruments, (5) distributing the user needs questionnaires, (6) evaluating current system usability via in-depth interviews and usability testing, (7) conducting follow-up discussions, (8) processing and analyzing the data, (9) designing improvements, (10) creating a prototype of the improved designs, (11) evaluating the improved design, and (12) formulating conclusions and suggestions.

The primary objective of this study is to evaluate the usability of this self-service system; such an evaluation focuses on how well users understand and efficiently utilize a product to achieve their desired goals while considering their satisfaction with the experience. Common techniques for usability evaluation include the System Usability Scale (SUS) questionnaire and usability testing. To

identify issues in a mobile IT Support application that was ineffective and inefficient at assisting users with the booking process, Murmanto et al. [14] employed a combination of SUS and Retrospective Think Aloud (RTA) methods, while Azhar et al. [15] used a combination of the SUS questionnaire and the User Experience Questionnaire (UEQ) to evaluate an e-commerce application. Other studies [16, 17] employed usability testing techniques to evaluate the user interface of existing applications.

As this case study intends to provide recommendations for how designers can improve the interface design of the e-commerce help center's self-service system, it used the SUS questionnaire and usability testing. These were used to evaluate the self-service system on the help page of E-Commerce XYZ to enhance usability and user satisfaction via a UCD approach. This research was structured as follows:

1. Problem Identification

The research started by identifying the root problem using a fishbone diagram, which helps to explore and visualize the various potential causes of the core issue systematically, breaking it down into contributing factors. The outcome of this phase is a clear and structured understanding of the problem, which is then used to formulate specific research questions and objectives. These questions and objectives guide the subsequent stages of the research, ensuring a focused and relevant investigation.

2. Literature Review

Based on the research questions, a comprehensive literature review was conducted to investigate findings on the topic from previous studies. This process involved systematically searching for, analyzing, and synthesizing relevant academic articles, books, and other scholarly sources to probe existing knowledge and findings related to the research topic. The result of this phase was the development of a theoretical framework, which served as the epistemological foundation of the study. It integrates key concepts, theories, and insights from the literature, providing a structured lens through which the research can be viewed and understood. It also helps to identify gaps in the current knowledge and establish the significance and context of the present study.

3. Determining Research Methodology

This step involved detailing the specific methodological steps and procedures to achieve the research objectives. In this study, the first two steps were selecting the research method (e.g., qualitative, quantitative, or mixed methods) and developing the study design (e.g., experimental or correlational research or a case study). As stated previously, a mixed-methods approach was used for this case study; the quantitative method used was a usability evaluation survey, while the qualitative approach used was in-depth interviews. The research design phase also involves defining and selecting the sampling strategies, data collection techniques, and instruments (e.g., surveys, interviews, or observational checklists); in this study, surveys, instruments, and usability testing were used. The study authors also developed a clear plan for data analysis, as detailed below. By outlining these procedures, they sought to ensure a systematic and rigorous approach when answering the research questions, enhancing the validity and reliability of the findings while achieving the stated objectives.

4. Selecting Research Instruments

This study utilized various instruments (i.e., demographic and open-ended questionnaires) to gather comprehensive data on participant backgrounds and qualitative insights. Specifically, a demographic questionnaire gathered information about participants, a set of initial questions inquired about ____, the SUS provided a standardized measure of usability through participant ratings, and follow-up questions measured ____. The SUS measures user satisfaction through a questionnaire with ten statements rated from "strongly disagree" to "strongly agree" [18]. This study used this instrument for its efficiency and reliability in quickly providing accurate user feedback, particularly since it has been adapted into Indonesian [19] for localized usability assessments.

In addition, in-depth interview questions delved into participant experiences and perceptions through a remote format, offering qualitative understandings. Prototypes simulated system interfaces for user feedback on design concepts, while task scenarios simulated real-world interactions to assess usability and identify improvements. This methodological approach ensured a robust evaluation of system usability to address user needs effectively.

5. Distributing Questionnaires

The usability evaluation survey of the current self-service system began with distributing the questionnaires for demographic information, initial questions, the SUS questionnaire, and follow-up questions. The survey was conducted via the Populix portal and had 200 respondents. The survey responses were analyzed to gauge user perceptions and identify areas needing improvement.

6. Evaluating Current System Usability

Usability testing is a key UX research method in which participants perform specific tasks using a user interface while researchers observe and gather feedback. According to [26], the main goals are identifying design issues, finding improvement opportunities, and understanding user behaviors and preferences. This method helps uncover design flaws [27] by observing how users interact with a product to complete tasks, providing valuable insights for improvements. Usability testing can be qualitative or quantitative [26]; the former focuses on insights into user interactions, while the latter collects metrics like task success rates.

Remote usability testing is popular due to its cost and time efficiency compared to in-person studies [27]. Remote moderated tests use screen-sharing software with facilitators and participants in different locations. Remote unmoderated tests involve participants completing tasks independently, with researchers later reviewing session recordings and metrics. Remote moderated tests are cheaper, faster, and more convenient than in-person studies [28], though they require significant preparation to set up the necessary tools.

This study conducted remote usability testing using the current system's prototype and task scenarios on Figma and Maze. These sessions were held online, moderated by the researcher, and involved individual participants who agreed to participate. The prototype mimicked the current system to allow realistic use cases and tasks.

7. Follow-Up Discussion

In-depth interviews, a qualitative research technique involving intensive interviews with a few respondents to explore their perspectives [29], were conducted with 12 participants who completed the usability testing to gather further insights. In UX research, these are termed user interviews and involve asking participants about a topic, listening to their responses, and following up with questions to gain deeper insights [30]. This method helps understand users' experiences, challenges, thoughts, motivations, and preferences.

Key insights from user interviews include those relevant to their experiences, notable impressions, challenges, thoughts and feelings about specific topics, important aspects, mental models, and motivations and desires. The process for conducting user interviews includes planning, developing instruments, collecting data, analyzing data, and disseminating findings [29]. Since leading questions can lead to inaccurate responses [31], avoiding them is crucial.

This study implemented the following steps when conducting user interviews [30]: (1) the study authors first identified goals and defined what they wanted to learn; (2) next, an interview guide was prepared; (3) open-ended questions were developed; (4) the interview guide and questions were then piloted and tested to identify needed changes; (5) when conducting the interviews, the interviewers began with easy questions and explained the interview's purpose and how the information will be used; (6) the interviewers ensured to build rapport with and make participants feel comfortable and trusting; and (7) finally, the interviewers followed up with questions to delve deeper into participants' responses.

8. Data Processing

In this study, Brooke's scoring method [18] was used to calculate the SUS score; positively worded statements (1, 3, 5, 7, 9) were scored by subtracting 1 from the scale value, and negatively-worded statements (2, 4, 6, 8, 10) were scored by subtracting the scale value from 5. Scores would range from 0 to 4 per item, and the total score was multiplied by 2.5 for the overall SUS score. Interpreting SUS scores on a 0 to 100 scale as percentages can be misleading [20]. Normative data [21, 22] suggest interpreting SUS scores as percentiles. For example, a traditional grading scale (90–100 = A, 80–89 = B, etc.; a score of 70 indicates a passing grade) has been recommended [21]. Sauro [22] found the average SUS score across 500 studies to be 68, such that scores over 68 are above average, and under 68 are below average.

The SUS questionnaire covers aspects of usability [23, 24, 25], such as learnability, efficiency, and memorability, which are linked to statements Q1, Q3, Q5, Q7, and Q9. Likewise, the error aspects of usability correspond to statements Q2, Q4, Q6, Q8, and Q10, while the satisfaction aspects are examined in statements Q1 and Q9.

The issues and pain points identified during the evaluation were analyzed to derive recommendations. Usability metrics, such as learnability, efficiency, memorability, errors, and satisfaction [32], refer to data collected to describe and measure the usability of an interface. These metrics are measured via a more quantitative approach to evaluating the usability of user interfaces and are crucial for assessing user experience and optimizing interface design to enhance usability and user satisfaction.

Regarding the creation of effective and intuitive interfaces, Nielsen [33] proposed 10 essential usability heuristics to help identify potential design issues that can impact UX: system status visibility; alignment between the system and the real world; user control and freedom; consistency and standards; error prevention; recognition rather than recall; flexibility and efficiency of use; aesthetic and minimalist design; user assistance in recognizing, diagnosing, and recovering from errors; and help and documentation. These heuristics direct designers to focus on enhancing usability and user satisfaction.

9. Designing Improvements

Feedback from the pain points analysis was used to draft an improved design. An interface must allow users to work with their physical, social, and cultural environments to be usable and enable them to achieve their goals and tasks effectively and efficiently [34]. Effective interface design should consider various factors, including usability, visual aesthetics, responsiveness across different devices, and ease of navigation.

Interface design should adhere to established design principles to create an intuitive, efficient, and satisfying experience for users. To this end, Shneiderman [35] outlines eight "golden rules" in *Designing the User Interface: Strategies for Effective Human-Computer Interaction*, and applying these rules helps designers create effective and satisfying interfaces for users and inspires successful product designs, as Apple's iOS exemplifies [36]. These eight rules, which are foundational in creating interfaces that enhance user satisfaction and usability across different contexts and devices, are: (1) strive for consistency, (2) enable frequent users to use shortcuts, (3) offer informative feedback, (4) design dialogue to yield closure, (5) offer simple error handling, (6) permit easy reversal of actions, (7) support internal locus of control, and (8) reduce short-term memory load [35].

10. Creating a Prototype of the Recommended Design

The improved design underwent prototyping using Figma, a versatile design tool that allows for creating interactive and visually appealing prototypes. This phase involved translating conceptual improvements into tangible interface elements, refining user flows, and ensuring consistency across various screens and interactions. Crucially, the prototype allowed for visualizing how the proposed design enhancements would function in a user-friendly manner, facilitating iterative testing and validation before implementation.

11. Evaluating the Improved Design

In addition, the new prototype underwent usability testing using Figma and Maze to assess its effectiveness. The specific steps in this process were (1) creating interactive versions of the prototype in Figma, which allowed for detailed design adjustments and user interaction simulation, and (2) conducting remote unmoderated usability tests through Maze, with participants asked to complete specific tasks within the prototype. By analyzing the data collected via Maze (i.e., task completion rates, time on task, and user feedback), researchers could evaluate how well the new design meets user needs and identify any remaining usability issues. This iterative testing ensured the design was refined based on real user experiences, ultimately leading to a more effective and user-friendly final product.

12. Conclusion and Recommendations

The final phase involved compiling the findings and providing actionable recommendations. During this phase, all data collected from the surveys, usability tests, and in-depth interviews were thoroughly analyzed to identify key insights and patterns. Researchers synthesized these insights to understand the overall usability of the self-service system and spotlight specific areas needing improvement.

C. Results and Discussion
1. Existing Features

The XYZ E-Commerce help center provides self-service options—the primary ones being quick solutions, help articles, and order complaints—with which customers can resolve issues without contacting customer service.

Quick solutions provide concise, accessible, accurate resolutions to customer issues. Available on the help center homepage, reference articles, and article pages, this feature includes quick solutions for transaction and non-transaction issues; it allows customers to obtain solutions by pressing a button related to their specific condition or status. The feature is tailored to user needs based on differing buyer and seller perspectives.

Help articles offer comprehensive text- and image-based information on how to resolve issues. Customers can search using keywords, displaying a list of relevant articles. Articles vary in format, some being text-only and others including images. The system matches articles to the user's current conditions, displaying quick solutions for ongoing transactions and including detailed info under a "More Info" button. Feedback and chatbot options are available at the bottom of each article.

Order complaints are accessible through the main menu and the order details page. This feature addresses two categories of problems: (1) lack of order receipt (e.g., undelivered, misrouted, or lost items) and long delivery times, each of which are resolved through courier investigations; (2) issues with a received order or issues immediately after receipt, including:

- Item damaged by seller/courier: Damage from the seller or during shipping, missing parts, or non-functional items.
- Item not as described: Wrong color, size, model, or incomplete components.
- Item shortage/incomplete: Fewer items delivered than ordered. Solutions include returns and refunds, exchanges, and delivery of missing items.
- Shipping cost discrepancy: Differences between paid and actual shipping costs due to weight or distance discrepancies.

2. Answering RQ1: What are the usability evaluation results for E-Commerce XYZ's self-service help center system?
a. Online Survey Results

An online survey was conducted using the Populix survey form, with questions distributed over a week. It featured three types of questions, each reviewed by a proofreader: screening questions, the SUS questionnaire, and follow-up questions about experiences with the help center. A total of 200 respondents participated, 83 (41.5%) of whom were male and 117 (58.5%) of whom were female, with participant ages ranging from 18 to 55. The largest age group (64 respondents or 32%) was 18–24 years old. The next largest (60

respondents or 30%) was 25–30 years old; the smallest group, with 5 respondents (2.5%), was 51–55 years old.

The online survey was distributed to 200 respondents. According to the survey, 75 respondents (37.5%) accessed or used the XYZ E-Commerce application daily. Among those who made transactions on XYZ E-Commerce, 50% reported that 1 in 4 transactions involved issues, the most common of which were shipping problems, followed by issues with digital balance transactions, payments, damaged orders, and refunds. Additionally, 78 respondents (39%) contacted customer service as their first option to resolve issues.

In addition, 84% of users reported having resolved issues independently without needing customer service, while 16% indicated they always needed customer service assistance to resolve their problems. Respondents' most frequently used feature to resolve issues was the customer service chat.
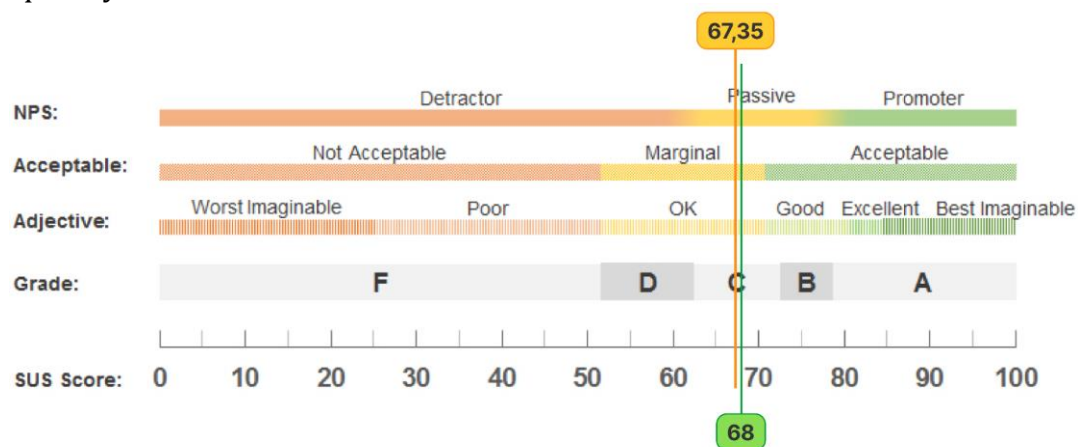

Figure 1. Visualization of the SUS Score Result

Notably, although 200 respondents completed the SUS questionnaire, there were anomalies in the data—that is, 5 respondents gave the same rating for all questions. Based on the remaining 195 valid responses, the overall SUS score was 67.35. This score falls into the "marginal" category, indicating that the system is usable but has room for improvement. It is also classified as Grade C, or "Okay," suggesting the system still requires development. The average standard SUS score is 68. In this study, the lowest score was 40, with 99 respondents scoring between 40 and 68, meaning that 99 respondents rated the E-Commerce XYZ help center's self-service system below the SUS standard average.

Table 1. SUS Score Result

Valid Responses	End Score	Grade	Adjective	Acceptable	NPS
195	67.35	C	Okay	Marginal	Passive

More detailed comparisons of each question's score are shown in Figure 2. The highest score was for question 1, indicating users would use the system again. The lowest score was for question 10, indicating users needed to get accustomed

to the system first. Next, the frequency mapping of each statement is detailed in Figure 3, showing the frequency of responses to each statement.
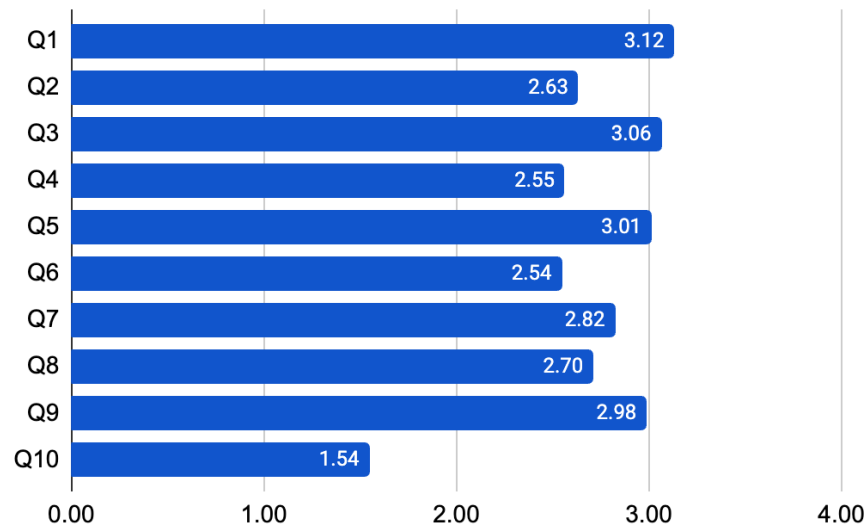

Figure 2. The distribution of the SUS Score

This study mapped the SUS results to usability aspects according to the approach of [23], [24], and [25] (see Table 2.). The aspects of learnability, efficiency, and memorability relate to statements Q1, Q3, Q5, Q7, and Q9; the error aspect of usability is covered by statements Q2, Q4, Q6, Q8, and Q10; finally, satisfaction is covered by statements Q1 and Q9.

Table 2. The mapping between SUS and usability aspects

Statement Number	Usability Aspects
Q1, Q3, Q7	*Learnability*
Q3, Q5, Q8, Q9	*Efficiency*
Q7	*Memorability*
Q2, Q4, Q6, Q8, Q10	*Errors*
Q1, Q9	*Satisfaction*

Regarding learnability, efficiency, and memorability, responses to Q1, Q3, Q5, Q7, and Q9 indicate that most respondents were positive about or rated highly the learnability, efficiency, and memorability of the XYZ E-Commerce help center's self-service system. This indicates that users found the system easy to learn to use, efficient, and memorable. However, based on the responses to Q7, some respondents were unsure if others would quickly understand how to use the system, indicating a need for improvement in learnability and memorability.

Next, concerning errors, the responses to Q2, Q4, Q6, Q8, and Q10 support that most respondents did not encounter significant obstacles or difficulties using the XYZ E-Commerce help center's self-service system. However, some respondents found it challenging to use, and many were unsure if others could use

the system easily, which suggests that reducing user errors is needed to achieve a more user-friendly system.

Regarding satisfaction, the responses to Q1 and Q9 show that most respondents agreed that they felt satisfied or expressed satisfaction after using the XYZ E-Commerce help center's self-service system; this satisfaction should be maintained so that users can continue to use the system smoothly in the future.

Overall, the usability of the XYZ E-Commerce help center's self-service system is adequate but requires improvements. The SUS evaluation by 200 respondents resulted in a final score of 67.35 or Grade C, indicating the system is only "Okay" and has a marginal acceptability range. Most respondents found the system easy to use and did not experience significant difficulties. However, some responses indicate that improvements are needed in learnability, memorability, and error reduction.

Based on the online survey results, users experience 23 pain points when using the XYZ E-Commerce help center's self-service system. All identified pain points were mapped into predefined usability aspects to identify core issues in the system. The mapping results indicated that the most significant issue for users is learnability—that is, users find the self-service help center features difficult to learn and use.

b. Usability Testing and In-Depth Interview Results

User survey results for buyer-type users were grouped into three personas.

● Persona 1: A tech-savvy 21-year-old student who frequently uses e-commerce for daily needs and hobbies. Busily scheduled, he relies on efficiency and quick solutions.
Needs: Quick, accurate information about shipment status; guides on using app features optimally; technical support if app issues arise.
Pain points: Insufficiently detailed explanations; slow shipping; difficulty finding specific information in the help center.
Expectations: Detailed and complete information to solve problems quickly.

● Persona 2: A 29-year-old young professional focused on his career who uses e-commerce for household and work-related purchases; he values efficiency and quick solutions.
Needs: Information about return policies, product recommendations that meet his needs, and quick solutions if order issues arise.
Pain points: Difficult return processes; limited product information; slow customer service responses.
Expectations: Quick, efficient problem-solving.

● Persona 3: A 43-year-old housewife runs a small home-based business and uses e-commerce to purchase supplies and household items. Although not very tech-savvy, she strives to keep up with technology to manage her business effectively.
Needs: Clear, easy-to-follow guides on using the app; information about promotions and discounts; quick assistance for technical issues
Pain points: Difficulty understanding new app features; complex technical instructions; slow customer service.
Expectations: Easy-to-understand guides and responsive customer service.

Usability testing was conducted with 12 respondents using the current system prototype (see Table 3). During usability testing with six task scenarios, 3 out of 12 users had difficulty with Task 1, resulting in a 75% success rate (while 25% of participants found it difficult). The success rate for Task 2 was 100%, with all respondents completing it successfully and easily. The success rates for Tasks 3 and 4 were both 50% (one out of 12 participants gave up before completion in the third task, while two out of 12 gave up in the fourth), indicating that these tasks were not easy. The success rate for Task 5 was 41.6%, and 41% of participants found it challenging, suggesting it was difficult. Finally, 16% of participants found the sixth task difficult, indicating that this task was easy to complete (its success rate was 84%). Based on the usability testing results, users faced the most difficulty with tasks 3, 4, and 5; therefore, these features warrant refinements to enhance usability.

Tabel 3. The respondent's success in completing the task scenario

No	Respondent Code	Task					
		1	2	3	4	5	6
1	U1						
2	U2						
3	U3						
4	U4						
5	U5						
6	U6						
7	U7						
8	U8						
9	U9						
10	U10						
11	U11						
12	U12						
Total failed		0	0	1	12	1	0
Total difficulty		3	0	5	4	4	2
Total success		12	12	11	10	11	12
Total problematic task		**3**	**0**	**6**	**6**	**5**	**2**

Legend:

      Respondents who failed to complete the task

      Respondents who completed the task, but had difficulty

c. In-Depth Interview Results

Data obtained from in-depth interviews were analyzed using content analysis, where qualitative data were organized into categories, the frequencies of

which were counted. Quotes identified as issues were collected and grouped into problem categories or themes. Based on the interview results, the identified problems were classified according to usability principles (learnability, efficiency, memorability, errors, and satisfaction), and 29 pain points were identified in the self-service help center system. All pain points were then mapped to usability aspects to pinpoint core issues within the system (see Table 4). The mapping results indicated that most user issues were related to efficiency, and users felt that too many steps were required to obtain solutions or achieve their goals.

Tabel 4. Pain Points Help Center Self-Service System from Interview Results

Usability Aspects	Statement Code	Count
Learnability	PPHH2, PPSCK1, PPSCK2, PPSCK3, PPSCD3, PPCR12, PPCR15, PPCR16, PPAB7, PPAB9, PPAB10, PPAB13	12
Efficiency	PPHH1, PPHH3, PPHH4, PPSCL1, PPSCL2, PPSCL3, PPSCL4, PPSCK1, PPSCK2, PPSCK3, PPSCD2, PPCR12, PPCR14, PPCR16, PPAB7, PPAB11, PPAB13	17
Memorability	PPSCK1, PPSCK2, PPSCK3, PPAB7, PPAB9, PPAB10, PPAB12	7
Errors	PPHH1, PPHH3, PPSCL5, PPSCD3, PPCR12, PPCR16, PPAB7, PPAB8, PPAB9, PPAB10	10
Satisfaction	PPSCL1, PPSCL3, PPSCD1, PPSCD2, PPCR13, PPCR17, PPCR18	7

d. Identification of Self-Service Help Center Issues

A total of 48 pain points were identified from the survey and in-depth interviews. All were mapped to usability aspects to understand the core issues within the system. Based on these results, the primary issue users reported in both the survey and interviews pertained to learnability. Related pain points were analyzed and mapped to various usability heuristics components to gain deeper insights into the issues users encounter and how these issues can be connected with usability heuristics principles that serve as guidelines for designing effective and efficient user interfaces.

When mapped against usability heuristics, the mapping results indicate that the primary issue relates to the principle of "user control and freedom." In other words, many reported pain points are associated with user control and freedom when using the system. Table 5. visualizes the number of pain points identified for each component of usability heuristics and provides a clear overview of the distribution of user issues based on each heuristic component.

Tabel 5. The distribution of the pain points identified by Usability Heuristic components

Usability Heuristic	Pain Points Code	Count
User Control and Freedom	P13, P17, P26, P43, P44, P45, P47, P48	8
Recognition Rather than Recall	P15, P22, P24, P25, P27, P29, P41	7

Usability Heuristic	Pain Points Code	Count
Flexibility and efficiency of use	P16, P23, P33, P35, P36, P38, P46	7
Match Between the system and the Real World	P5, P8, P10, P11, P34, P37	6
Aesthetic and Minimalist design	P1, P3, P7, P31, P39, P40	6
Help users recognize, diagnose, and recover from errors	P6, P9, P18, P20, P42	5
Visibility of System Status	P2, P12, P14	3
Help documentation	P19, P28, P32	3
Error Prevention	P4, P21	2
Consistency and standard	P30	1

3. **Answering RQ2: What are the design improvement recommendations for E-Commerce XYZ's self-service help center and resolution center interface?**

This study provides 48 recommendations or suggestions to enhance and improve the performance and effectiveness of the self-service system of the help center. These recommendations aim to provide a better experience for users. After mapping the interview and survey responses against Shneiderman's eight golden rules (see Table 6.), the most needed improvements pertain to "informative feedback" and "reduce short-term memory load." This indicates that users often encounter issues receiving informative feedback from the system and face difficulties remembering important information in the short term.

Tabel 6. Mapping of Proposed Improvement Codes based on Shneiderman's 8 Golden Rules

Recommendation Code	Shneiderman's 8 Golden Rules	Count
E5, E6, E10, E11, E18, E21, E22, E26, E31, E38, E41	Informative Feedback	11
E1, E2, E3, E15, E16, E23, E30, E32, E34, E37, E45	Reduce short-term memory load	11
E8, E12, E13, E25, E35, E36, E42, E43, E44	Support internal locus of control	9
E9, E17, E19, E27, E40	Error Handling	5
E14, E20, E29, E33	Shortcuts	4
E24, E46, E47	Dialogue	3
E7, E39	Consistency	2
E4, E28	Permit reversal of actions	2

On the current above-fold section of the help center homepage, several components are featured to assist users in navigating the system effectively. Tabs for user categories (i.e., buyers and sellers) are at the top. As many respondents do not engage in selling on the e-commerce platform, they found these tabs less relevant. The search box is available to search for articles, but not all users notice it, leading to confusion about its location when articles are not immediately found. Current issue information is positioned below the search box; although this section details current issues, it is not heavily utilized, as users focus more on transaction-related information. Transaction insights predict transaction issues and offer quick solutions via black tooltips above the transaction card. However, these tooltips obscure essential information, causing user frustration. For example, action buttons recommending solutions for transaction issues are located within the transaction section, but the order status label is not prominently visible. A floating tooltip at the bottom of the screen can obscure the frequently used articles section. Beneath the transaction card, a list of articles is provided with two tabs: one for transaction-related issues and another for frequently asked questions. Each displays a maximum of seven articles. The section for additional topics consists of three topics related to transactions represented with icons beneath the article list, as well as a menu for other topics available on E-Commerce XYZ. The "Report Issue" feature, which allows users to report violations and criminal activities, is positioned after the topics section, followed by awards received by the help center and consumer protection contact information at the bottom.

Based on the results of the survey, usability testing, and interviews, several issues on the help center homepage have been identified as pain points for users:

- Relevance of tabs: The buyers and sellers tabs are deemed irrelevant by many users who do not sell on the platform.
- Visibility of search box: Users struggle to locate the search box when desired articles are not readily found.
- Underutilization of current issue information: Users focus more on transaction-related details than current issues.
- Tooltips overlap: Tooltips covering critical information on transaction cards cause frustration.
- Chatbot widget placement: Positioned at the bottom, the chatbot can obscure the frequently used articles section, impacting usability.

To enhance user experience and address these issues, the following improvements are proposed:

- Current Issue Information: Rename to "Announcements" for clearer understanding.
- Quick solution tooltips: Replace with static banners above transaction predictions to avoid covering crucial details.
- Chatbot widget: Move to the bottom of the help center homepage to minimize overlap with article sections.

Regarding the below-fold section, users pay less attention to this section, except for the "Find Solutions in Articles" subsection. Recommendations of relevant and frequently visited articles are crucial here. The search feature should be prominent for users seeking non-listed articles. The footer, featuring awards

and consumer complaint service details, remains satisfactory based on feedback and requires no significant changes.

If the layout and features are optimized, users can easily navigate the help center to find solutions, ensuring a more efficient and satisfactory experience.

a. Enhanced Interface Design for Shipping Order Tracking

The current design of the quick solution feature for shipping orders includes up to two action buttons and a ticker displaying estimated arrival times. Usability testing shows it is easy to use, but user feedback suggests the information provided is insufficiently helpful. Upon pressing the Track button, a bottom sheet with three sections is displayed: transaction details, shipping status, and package location info. However, it lacks specific details about the exact package locations and conditions at delivery points. There's also no courier contact info, which is essential for coordinating deliveries. Proposed improvements are:

● Detailed location information: Add precise package location details to the new tracking page for accurate arrival time prediction.
● Courier contact details: Include courier name and phone number in shipping details for user communication and delivery coordination.
● Visual confirmation (Tracking with pinned locations): Introduce photos of the package at delivery points to reassure users about its condition during shipping.
● Issue transparency: Display delay reasons or issues on the tracking page to inform users about shipment complications.
● Real-time updates: Add a status update button to refresh shipment details instantly, enhancing user experience.
● Complaint submission: Enable users to lodge complaints directly from the tracking page for prompt issue resolution.

b. Improving Help Article Interface Design

The current help article feature includes text tutorials with screenshots and concise solution-oriented articles. Users find the page overwhelming with text and visually unappealing, often skipping articles altogether. The bottom widget for user ratings is seldom used, as users prefer direct action after finding a solution. Recommendations for improvement include:

● Enhance visual appeal: Introduce highlight banners in article titles for immediate user attention.
● Provide a feedback mechanism: Add a feedback widget at the end of articles to gather user input.
● Implement multimedia integration: Include short videos to supplement textual explanations.
● Modernize navigation: Redesign the bottom section for easy access to further assistance, ensuring a modern and user-friendly appearance.

These enhancements aim to make help articles more engaging, effective, and user-friendly.

c. Enhancing Quick Resolution for Orders and Complaints

Users find the complaint submission process in the resolution center overly complex. They suggest simplifying the initial step, allowing users to select the problem type by eliminating the need to click a "Select Issue" button after making their choice. Similarly, users recommend streamlining the solution selection

process by eliminating the need to click a "Select" button after choosing a solution, proceeding directly to the next page. The implemented improvements are:

- Simplified issue selection: Users proceed directly to the next page after selecting the problem type, eliminating the "Select Issue" button.
- Streamlined solution selection: Users proceed directly to the next page after selecting a solution, eliminating the "Select" button.
- Additionally, users encountered confusion when submitting complaints about received items because the "Item Received with Issues" button was hidden within the main "Item Received" button. They suggested adding a direct option to complain about items received with issues under point 3 alongside the main button.

These changes aimed to simplify the complaint process, improve user experience, and enhance clarity in navigating the resolution center.

d. Implementing Design Improvements for Articles with Quick Solutions

The current "smart article" format integrates quick solutions to streamline issue resolution without users needing to navigate away from the page. However, user feedback suggests that the "More Info" section is often overlooked as users do not find it helpful. Users typically turn to customer service for assistance when quick solutions do not suffice. Recommended enhancements are as follows:

- Enhanced info preview: Include a preview or concise information excerpt within the "More Info" section to entice users to explore the full article content.
- Consistent display of quick solutions: Ensure uniform presentation of quick solutions across the help center, maintaining visual consistency for a seamless user experience.

These improvements aim to increase user engagement with article content and optimize the effectiveness of quick solutions, promoting efficient issue resolution through accessible self-service features.

With the new features, users found it easier to access and utilize the self-service features of the help center. The updated features were designed to assist users in finding the help and solutions they needed without confusion or difficulty. Results from usability testing showed that all 12 respondents could complete their tasks effectively, indicating that the implemented design changes significantly enhanced usability. Therefore, the improvements to the help center's self-service interface successfully met users' needs and expectations.

D. Conclusions

The conclusions drawn from the usability evaluation of XYZ E-Commerce's self-service help center system and recommendations for interface improvements are as follows: The study commenced with a usability evaluation using a survey (including the SUS questionnaire), with online surveys distributed to 200 respondents. From 195 valid responses, the overall SUS score obtained was 67.35, meaning that usability was "marginal" and indicating room for improvement. This score falls within Grade C, or "Okay," suggesting that while parts of the self-service system are functional, enhancements are necessary to achieve a higher SUS score. The qualitative analysis supported these findings through usability testing with 12 respondents. It identified learnability and efficiency issues as predominant during

task scenario executions. Subsequently, detailed qualitative and quantitative analyses were performed to uncover user issues, revealing 48 specific concerns from the online surveys; recommendations for solutions were then formulated based on these identified issues.

In-depth interviews with 12 usability testing respondents further evaluated prototype improvements, demonstrating that users found resolving their issues with the recommended interface enhancements easier. Based on the extensive discussions and improvements detailed throughout this conversation, several conclusions can be drawn regarding the enhancement of the help center interface. The initial analysis highlighted usability issues, including the visibility and relevance of interface elements like tabs, search boxes, and tooltips, which were addressed through strategic redesigns. By reorganizing components and enhancing visual cues, such as implementing consistent highlight banners and optimizing the placement of widgets like the chatbot, usability was significantly improved. Usability testing and interviews affirmed that these changes effectively streamlined user navigation and task completion, as evidenced by the successful task outcomes reported by participants. Overall, the iterative process of identifying pain points, proposing enhancements, and implementing refined designs led to a more intuitive and user-friendly help center interface, aligning closely with user expectations and needs.

The study provides actionable recommendations for developers of XYZ E-Commerce's self-service help center system and future researchers. The former are advised to implement interface design improvements based on the study's findings to better cater to user needs and preferences; regular post-implementation usability evaluations are also recommended to ensure sustained and improved usability over time. The latter are encouraged to explore alternative usability evaluation methods, such as eye-tracking or heuristic analysis, to uncover and address any remaining usability issues. Other future research recommendations include investigations to enhance information architecture for intuitive user access and overall customer experience to better understand user satisfaction.

E. Reference

[1] "Indonesia: e-commerce number of users 2020-2029," *Statista*. https://www.statista.com/forecasts/251635/e-commerce-users-in-indonesia#:~:text=The%20number%20of%20users%20in

[2] S. Kabanda, "E-commerce Institutionalization Is Not For Us: SMEs Perception of e-commerce in Tanzania," *Journal of Information System*, vol. 3, no. 1, 2011.

[3] "Customer Service Excellence Survey 2022," *Deloitte*. https://www2.deloitte.com/si/en/pages/deloitte-digital/Customer-Service-Excellence-Survey-2022.html

[4] "Share of customers by if self-service helped with their issue 2017," *Statista*. https://www.statista.com/statistics/810332/share-of-customers-by-if-self-service-helped-with-their-issue/

[5] M. L. Meuter, A. L. Ostrom, R. I. Roundtree, and M. J. Bitner, "Self-Service Technologies: Understanding Customer Satisfaction with Technology-Based Service Encounters," Journal of Marketing, vol. 64, no. 3, pp. 50–64, Jul. 2000.

[6] "Customer Service Excellence 2023," Deloitte. Available: https://www2.deloitte.com/content/dam/Deloitte/fr/Documents/consulting/deloitte_customer-excellence-report-2023.pdf

[7] "Self-service issues experienced by customers 2018," *Statista*. https://www.statista.com/statistics/810295/self-service-issues-experienced-by-customers/

[8] "Improve Customer Self-Service Design With Best Practices - ServiceTarget," *Service Target.* https://www.servicetarget.com/blog/improve-customer-self-service-design-with-these-best-practices-tips

[9] K. Salazar, "Minimize the Need for Customer Service to Improve the Omnichannel UX," *Nielsen Norman Group*, Sep. 11, 2016. https://www.nngroup.com/articles/customer-service-omnichannel-ux/

[10] Interaction Design Foundation, "What is User Centered Design?," *The Interaction Design Foundation*, Jun. 05, 2016. https://www.interaction-design.org/literature/topics/user-centered-design

[11] H. Sharp, Y. Rogers, and J. Preece, *Interaction Design : beyond human-computer Interaction*, 5th ed. Indianapolis, In: Wiley, 2015.

[12] D. Norman, "Human-Centered Design (HCD)," *Interaction Design Foundation*. https://www.interaction-design.org/literature/topics/human-centered-design

[13] E-commerce XYZ., rep., 2023

[14] I. R. Murmanto, Sunardi, R. M. Kamilia, G. M. Yusuf and R. Kurniawan, "User Experience Evaluation of IT Support Mobile Application Using System Usability Scale (SUS) and Retrospective Think Aloud (RTA)," *2022 Seventh International Conference on Informatics and Computing (ICIC)*, Denpasar, Bali, Indonesia, 2022, pp. 01-08, doi: 10.1109/ICIC56845.2022.10006974.

[15] T. F. Azhar, H. B. Santoso and P. O. H. Putra, "Evaluation of Usability and User Experience of Shopee as One of the Top E-Marketplaces in Indonesia," *2022 10th International Conference on Information and Communication Technology (ICoICT)*, Bandung, Indonesia, 2022, pp. 305-309, doi: 10.1109/ICoICT55009.2022.9914895.

[16] Zulfiandri, S. N. Putri and A. Subiyakto, "Evaluating User Interface of A Transport Application Using Usability Evaluation Methods," *2021 9th International Conference on Cyber and IT Service Management (CITSM)*, Bengkulu, Indonesia, 2021, pp. 1-7, doi: 10.1109/CITSM52892.2021.9589020.

[17] A. A. Gede Yudhi Paramartha, K. A. Seputra, F. Azima, D. P. Putra, E. Dwi and K. Y. E. Aryanto, "Usability Evaluation of an Interactive Educational Mobile Application," *2022 24th International Conference on Advanced Communication Technology (ICACT)*, PyeongChang Kwangwoon_Do, Korea, Republic of, 2022, pp. 491-495, doi: 10.23919/ICACT53585.2022.9728778.

[18] Brooke, John. (1995). SUS: A quick and dirty usability scale. Usability Eval. Ind.. 189.

[19] Z. Sharfina and H. B. Santoso, "An Indonesian adaptation of the System Usability Scale (SUS)," *2016 International Conference on Advanced Computer Science and Information Systems (ICACSIS)*, Malang, Indonesia, 2016, pp. 145-148, doi: 10.1109/ICACSIS.2016.7872776.

[20] Brooke, John. (2013). SUS: a retrospective. Journal of Usability Studies. 8. 29-40.

[21] A. Bangor, P. T. Kortum, and J. T. Miller, "An Empirical Evaluation of the System Usability Scale," *International Journal of Human-Computer Interaction*, vol. 24, no. 6, pp. 574–594, Jul. 2008, doi: https://doi.org/10.1080/10447310802205776.

[22] J. Sauro, *A Practical Guide to the System Usability Scale: Background, Benchmarks & Best Practices*. Measuring Usability LLC, 2011.

[23] A. W. Soejono, A. Setyanto, and A. F. Sofyan, "Evaluasi Usability Website UNRIYO Menggunakan System Usability Scale (Studi Kasus: Website UNRIYO)," *Respati*, vol. 13, no. 1, Mar. 2018, doi: https://doi.org/10.35842/jtir.v13i1.213.

[24] M. L. Nuriman and N. Mayesti, "Evaluasi Ketergunaan Website Perpustakaan Universitas Indonesia Menggunakan System Usability Scale," *BACA: Jurnal Dokumentasi Dan Informasi*, vol. 41, no. 2, p. 253, Dec. 2020, doi: https://doi.org/10.14203/j.baca.v41i2.622.

[25] T. L. Mardi Suryanto, A. Faroqi, and W. N. Simarmata, "SYSTEM USABILITY SCALE (SUS) SEBAGAI METODE PENGUJIAN KEGUNAAN PADA SITUS PROGRAM STUDI", *SITASI*, vol. 2, no. 1, pp. 285-294, Sep. 2022.

[26] K. Moran, "Usability Testing 101," *Nielsen Norman Group*, Dec. 01, 2019. https://www.nngroup.com/articles/usability-testing-101/

[27] Interaction Design Foundation - IxDF, "What is Usability Testing?," *Interaction Design Foundation - IxDF,* Jun. 02, 2016. https://www.interaction-design.org/literature/topics/usability-testing

[28] K. Moran and K. Pernice, "Remote Moderated Usability Tests: How to Do Them," *Nielsen Norman Grou*p, Apr. 26, 2020. https://www.nngroup.com/articles/moderated-remote-usability-test/

[29] C. Boyce and P. Neale, "CONDUCTING IN-DEPTH INTERVIEWS: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input," NY Health Foundation. May 2006. Available: https://nyhealthfoundation.org/wp-content/uploads/2019/02/m_e_tool_series_indepth_interviews-1.pdf

[30] M. Rosala and K. Pernice, "User Interviews: How, When, and Why to Conduct Them," *Nielsen Norman Group*, Sep. 17, 2023. https://www.nngroup.com/articles/user-interviews/

[31] J. Nielsen, "Interviewing Users," *Nielsen Norman Group*, 2010. https://www.nngroup.com/articles/interviewing-users/

[32] J. Nielsen, "Usability 101: Introduction to usability," *Nielsen Norman Group*, Jan. 03, 2012. https://www.nngroup.com/articles/usability-101-introduction-to-usability/

[33] J. Nielsen, "10 Heuristics for User Interface Design," *Nielsen Norman Group*, Apr. 24, 1994. https://www.nngroup.com/articles/ten-usability-heuristics/

[34] J. T. Hackos and J. Redish, *User and task analysis for interface design*. New York: John Wiley & Sons, 1998.

[35] B. Shneiderman, C. Plaisant, M. Cohen, S. Jacobs, and N. Elmqvist, *Designing the user interface : strategies for effective human-computer interaction 6th ed*. Boston Pearson, 2016.

[36] E. Wong, "Shneiderman's Eight Golden Rules Will Help You Design Better Interfaces," *The Interaction Design Foundation*, 2021. https://www.interaction-design.org/literature/article/shneiderman-s-eight-golden-rules-will-help-you-design-better-interfaces.