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Usability Evaluation and Alternative Design Recommendations for HSIS Mobile Application: A Case Study of PT HNI

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Abstract

Halal Network International (HNI) is considered as one of the sharia MLM-based companies in Indonesia. In order to fulfill the sales management needs, HNI developed HSIS application. The aims of this study are to conduct usability testing and to design alternative interface design recommendations for the HSIS Mobile application by using the User-centered Design (UCD) process. This study applied the System Usability Scale (SUS) Questionnaire, Open-ended Question (OEQ), and Task Scenario within Usability Testing (UT) as research instruments. There were 81 respondents involved in filling out the questionnaires. Furthermore, UT Phase 1 was conducted by involving 14 respondents. The results of these processes were categorized, and the design solutions were mapped based on Nielsen's Ten Usability Heuristic of Interface Design and Shneiderman's Eight Golden Rules of Interface Design. The alternative design solutions were tested again in UT Phase 2 and they showed a significant decrease in the number of usability issues. Thus, it proves that the alternatives design can provide positive improvement in the usability and user experience of the HSIS Mobile application.

A. Introduction

The continuous advancement of technology drives rapid changes in consumer behavior to purchase the goods and services they need, as well as the behavior of distributors managing transactions in order to promote products to consumers. Digital commerce services; especially, mobile, will have a significant impact on the business environment due to the ease, security, and convenience they provide to users [1]. According to a survey which had been conducted by McKinsey, since the pandemic there are 125 million new consumers who have adopted digital [2]. The survey results also show that more than half of the respondents use mobile applications by reading product reviews (54%) in order to decide on product purchases (56%). A survey in Indonesia by Data Reportal for the year 2023 shows that 62.6% of Indonesian consumers make online purchases weekly [3].

Consumer satisfaction with digital services should certainly be supported by the systems development with good usability. Unfortunately, the results of surveys which had been conducted over the past three years show a decrease in the value of customer satisfaction with digital applications globally [2]. In Figure 1, it shows that the main reason is the poor User Interface and User Experience (UI/UX) of the applications used. Consumer dissatisfaction with the product selection features and the payment experience features represents the highest average dissatisfaction with the usability of applications. Moreover, consumer dissatisfaction with the technology used certainly has a significant impact on their decision to continue using the application.

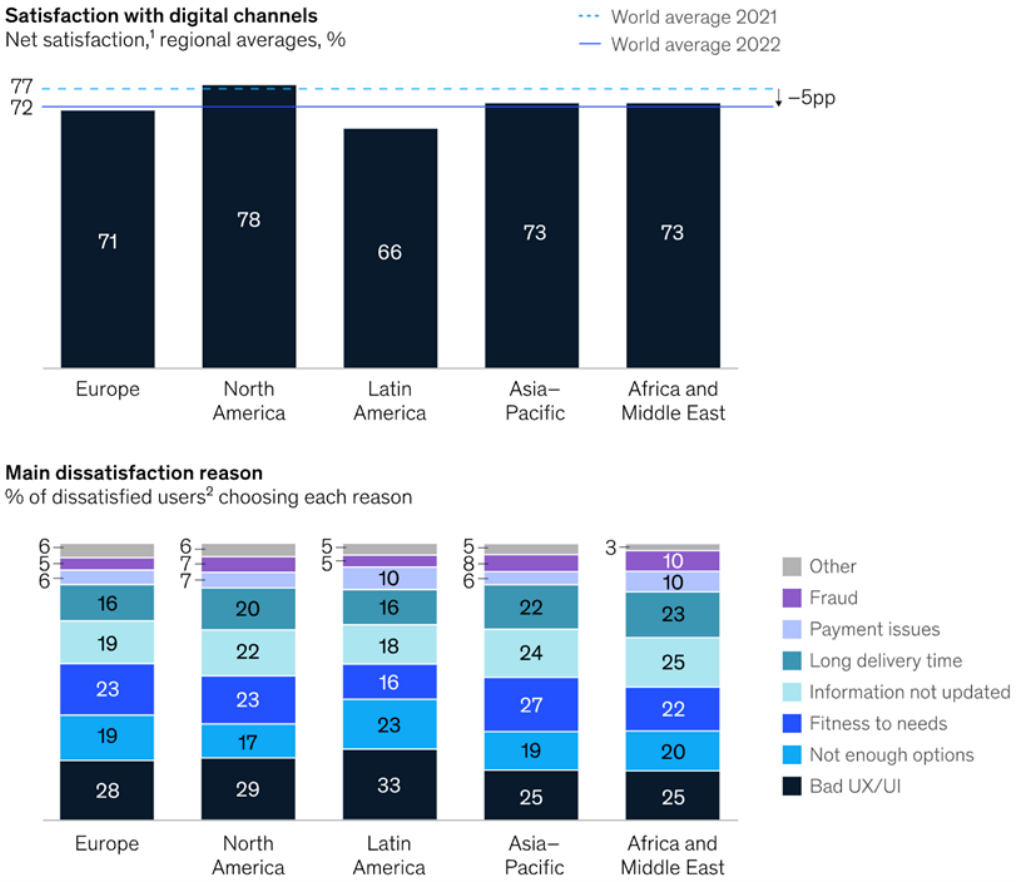

Figure 1. Consumer Satisfaction Value Towards Digital Channels [2]

Halal Network International (HNI) is a Sharia-based company in Indonesia which engages in herbal medicines distribution. Distribution is conducted by HNI stock agents using a direct selling or Multi-Level Marketing (MLM) model. One of the applications developed by HNI is the consumer application which is called as HNI Integrated System (HSIS), in which used by stock agents for transaction management. The HSIS application can be downloaded from both the Google Play Store and the App Store. Some of the modules in the HSIS application include Transactions, Purchases, Sales, Balance, and others. According to HNI's internal data, the download numbers for HSIS on the Play Store have tended to decrease year by year. It is also represented by the graph downloaded from HNI's internal data in Figure 2. The IT Director of HNI stated that since the HSIS Mobile application was released in 2020 until now, there has never been usability test conducted to evaluate the HSIS application.

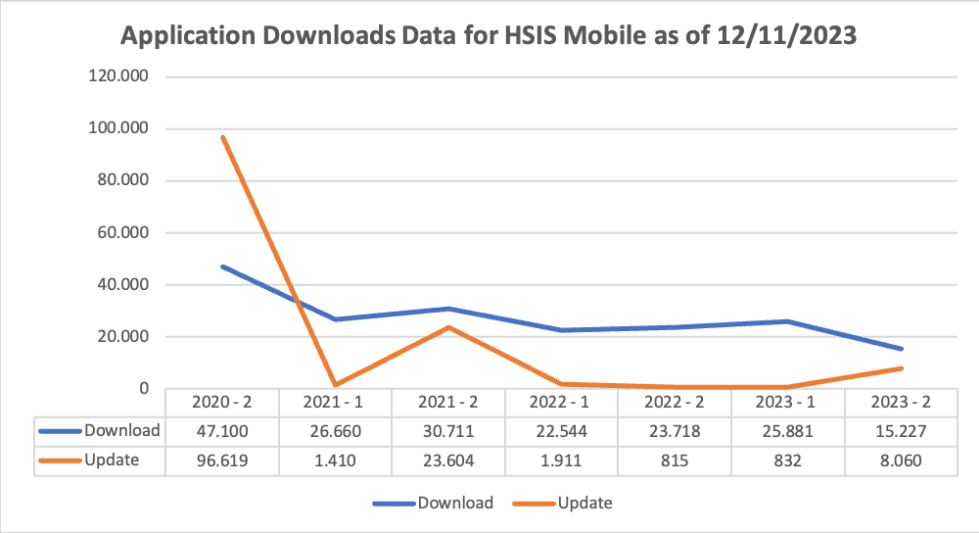

Figure 2. HSIS Mobile Download Numbers for the Years 2020 - 2023

Consumer dissatisfaction can be seen from the reviews and complaints which are submitted by consumers on the Play Store and the results of interviews with stock agents. Out of around 1000 reviews on the Google Play Store, there are 66 reviews related to usability [4]. In addition, interviews which had been conducted with three HNI stock agents revealed that the HSIS Mobile application is currently used less frequently compared to the website application because it is more complicated and difficult to understand to the HSIS website. The number of application downloads, critical reviews on the Google Play Store, and the results of interviews with stock agents show that the functionality of the HSIS application for HNI consumers is still not optimal. Moreover, poor reviews and constructive criticism suggest that the usability of HSIS still needs to be improved and developed more thoroughly. Based on this problem formulation, the researcher has formulated two research questions as follows;

RQ1. What are the results of the usability evaluation of the HSIS Mobile?

RQ2. What is the proposed design for improving the HSIS Mobile application interface design?

The aims of this study are to conduct a usability evaluation and to develop the design alternative recommendations for the HNI HSIS Mobile application. It is expected that this study can provide guidance for conducting usability evaluations; besides, can provide alternative design recommendations for the user interface of the HSIS Mobile application for HNI. The scope of this study is limited to the HSIS application owned by HNI and focuses on the usability evaluation in order to improve the usability value of the HSIS Mobile application.

B. Research Method

This study used mixed methods approach which combined both quantitative and qualitative methods [5][6]. The results from the quantitative and qualitative data analysis would be combined into a unified outcome, which would be presented as a solution for improving the HSIS application. The study utilized the System Usability Scale (SUS) Questionnaire, Open-ended Questions (OEQ), and Task Scenario within Usability Testing (UT) as research instruments. The research design was illustrated in Table 1 while the research flow was presented in Figure 3. The instruments in this study were divided into three parts in which conducted in three different stages. The first instrument was the SUS Questionnaire, which aims to obtain an overview of participants' satisfaction with the newly tested system. The SUS Questionnaire is distributed through a survey to current HSIS Mobile stock agent users. The second instrument was Task Scenarios, which involves tasks which need to be completed within the system/prototype after informing participants of the task's goal. After participants completed the task scenarios, researchers conducted open-ended questions through a brief semi-structured interview and allowed participants to express their feelings, criticisms, and suggestions regarding the newly tested system.

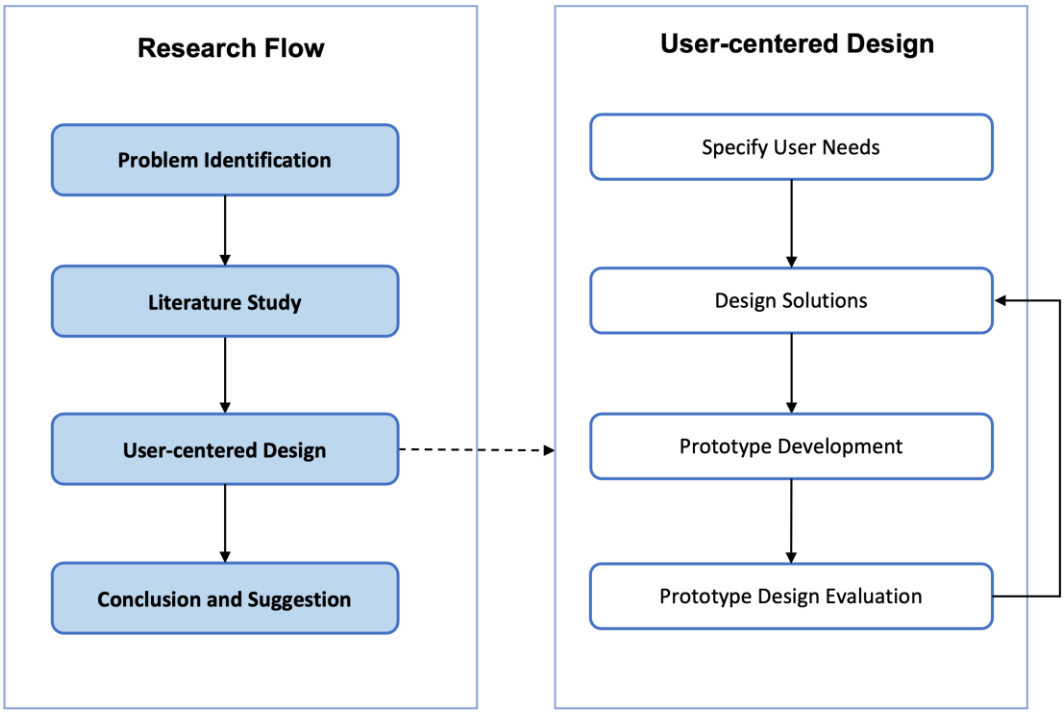

Figure 3. Research Flow

Table 1. Research Design

Attributes	Information
Classifications	Mixed Method Research
Category	Case Study
Purpose	Conduct usability evaluation and design alternative recommendations for the HSIS application.
Paradigm	Evaluative
Results	Proposed alternative design for the HSIS Mobile application
Data Collection	Usability Testing SUS Questionnaire and Open-ended Questions Semi-structured Interview
Sampling Strategy	Purposive Sampling

User-centered Design (UCD)

User-centered Design (UCD) is a design process which prioritizes the users as the focus and involves users at every stage in the development of design solutions [7]. UCD has been explained in ISO 9241-210:2010, which is broadly described as Human-centered Design and in the context of usability [8]. The four stages of UCD could be divided as illustrated in Figure 3. The implementation of the UCD's four stages in this research is as follows;

1. Understand and Specify the User Context: In this study, the problems faced by users were collected through Usability Evaluation of the existing HSIS
2. Specify User Requirements: The data collected in the previous stage would be processed and compiled into a list of usability issues for the HSIS application that need to be addressed
3. Produce Design Solutions: At this stage, the design of alternative designs prototype would be developed in accordance with the list of usability issues
4. Evaluate against the Requirements: The prototype would be tested again through a usability testing in order to determine if the provided design solutions could resolve the existing usability issues.

The four UCD processes served as a guide in the development or evaluation of the HSIS application design in this study. The iterative process conducted in UCD allowed for significant and continuous improvements and changes over time. If the evaluation of the design solutions is not able to resolve the specific issues experienced by users, the UCD process would be repeated.

Task Scenarios

This instrument consisted of set of task scenarios performed by participants testing the HSIS application as compiled in Table 2. The Task Scenario instrument was divided into two related parts: the goal and the scenario. The task list was based on the current description of the HSIS application displayed on the Google Play Store and App Store. Some of these features included Purchase Transactions, Sales, Balance, Stock Agent List, Customer Entry, Stock Agent Registration, Product Ordering, and Customer History. The output of this instrument was the completion status of participants, indicated whether the given task scenarios could be successfully completed or not.

Table 2. Task Scenarios

Functions	Goal	Scenario
Login	Stock agents of HNI can log in to the HSIS application	Your shift as an agent has just started, you can log in to your account on HSIS Mobile
Stock Agent List	HNI stock agents can search for a list of HNI stock agents	You want to restock your store with items that can be purchased offline at the nearest store. You need to search for the nearest HNI BC agent in your current city of residence
Transactions	HNI stock agents can input consumer transactions into the HNI system	A consumer who has become an agent wants to purchase 1 unit of X product with cash. As a stock agent, you need to input this transaction data
Edit Transactions	HNI stock agents can edit HNI consumer transactions	However, the consumer decided not to purchase the X product and instead opted for the Y product. As a stock agent, you need to edit the previous transaction data
Balance	HNI stock agents can check product stock and balance	Every day, you need to recheck the stock and balance available in your store. You can check your store's product stock and view your total HNI balance for this month
Purchase and Sales Reports	HNI stock agents can check purchase and sales reports	At the end of the month, you need to check the purchase report for and record it for your superior's report. Then, check the sales report and record it as part of your report to your superior.
Logout	HNI stock agents can log out of the HSIS application	Your shift has ended, and you can log out of your account on HSIS Mobile

System Usability Scale (SUS) Questionnaire

Survey participants completed the SUS Questionnaire by answering several questions. In previous research, the results indicated that the most effective tool for usability testing is the SUS which was proved by the use of 2,342 SUS questionnaires [9]. This questionnaire instrument consisted of 10 questions which were taken from the standard SUS questionnaire, which had been translated to Indonesia language and used in previous research [10]. The SUS Questionnaire would be used along with a Likert scale which participants should complete for each statement. The Likert scale ranges from 1 to 5, where 1 indicates Strongly Disagree (STS) and 5 indicates Strongly Agree (SS), as shown in Table 3.

Table 3. SUS Questionnaire Questions

System Usability Scale	Scale
Saya akan sering menggunakan sistem ini	1-5
Saya merasa sistem ini rumit untuk digunakan	1-5
Saya merasa sistem ini mudah digunakan	1-5
Saya membutuhkan bantuan dari orang lain atau teknisi dalam menggunakan sistem ini	1-5
Saya merasa fitur-fitur sistem ini berjalan dengan semestinya	1-5
Saya merasa ada banyak hal yang tidak konsisten (tidak serasi pada sistem ini)	1-5
Saya merasa orang lain akan memahami cara menggunakan sistem ini dengan cepat	1-5
Saya merasa sistem ini membingungkan	1-5
Saya merasa tidak ada hambatan dalam menggunakan sistem ini	1-5
Saya perlu membiasakan diri terlebih dahulu sebelum menggunakan sistem ini	1-5

Open-ended Question (OEQ)

This instrument was used in the semi-structured interview data collection method conducted after the first phase of Usability Testing (UT). The researcher conducted interviews with four questions as shown in Table 4. The interviews were conducted by using a think-aloud process where participants were free to express their opinions, suggestions, and complaints about the system/prototype that was just tested. In addition, this instrument is expected to help the researcher gain a broader understanding and perspective on user experience, application usability, and other related issues.

Table 4. List of Open-ended Questions for UT Phase 1

Category	Questions
General Overview	What is your opinion about the HSIS application in general?
User Experience	Did you experience any difficulties while using the HSIS application? If so, please explain the difficulties
User Interface	Is the feature display and design of the HSIS application good? Please share your opinion

Shneiderman's Eight Golden Rules of Interface Design

Shneiderman's Eight Golden Rules of Interface Design are fundamental guidelines for designing interaction systems, including application interface design [11]. These eight rules can be seen in Table 5.

Table 5. Shneiderman's Eight Golden Rules of Interface Design

Principles	Description
Strive for Consistency	Consistency should be applied to all elements in the design
Seek Universal Usability	The design should be able to meet the general needs of various groups
Offer Informative Feedback	The system should be able to provide feedback in the form of information
Design Dialogs to Yield Course	Business processes workflow in an application is formed sequentially
Prevent Errors	The system should provide instructions for users to prevent errors
Permit Easy Reversal of Actions	Users are allowed to repeat or delete actions they have performed
Keep User in Control	Provide users with control to choose the actions they intend to conduct
Reduce Short-term Memory Load	An interface which is easy to remember or recalls important information

All of Shneiderman's Eight Golden Rules of Interface Design were used as guidelines for designing interface improvement recommendations for the HSIS application in this study. In addition to serving as a reference for design planning, these rules can also be used for feature selection and appropriate improvements for each usability issue in the HSIS application.

Nielsen's Ten Usability Heuristics for Interface Design

Ten Heuristics for User Interface Design are principles developed by Nielsen as guidelines for interaction design [12]. These principles are called as heuristics

because of their practical and broad nature, rather than being specific usability guidelines for a particular domain. The ten rules of Ten Heuristics for User Interface Design can be seen in Table 6.

Table 6. Nielsen's Ten Usability Heuristics for Interface Design

Principles	Description
Visibility of System Status	The system should inform users of status and information through appropriate responses
Match Between System and The Real World	The design should use language which is easy to understand for users
User Control and Freedom	Provide options to cancel or repeat activities which are mistakenly conducted
Consistency and Standards	Every word and design element which are used should be consistent and follow standards
Error Prevention	Provide users with options for confirmation or validation to prevent errors
Recognition Rather than Recall	The system should minimize the user's memory load as much as possible
Flexibility and Efficiency of Use	Shortcuts should be provided in order to enhance user flexibility and efficiency in the application
Aesthetic and Minimalist Design	There is no need to add irrelevant and unnecessary elements and information
Help Users Recognize, Diagnose, and Recover from Errors	The use of visual elements, messages, solutions, and error information should be explained simply to the user
Help and Documentation	Users still need guidance in order to understand the activities which need to be completed in the system

These ten principles of Nielsen's Ten Heuristics for User Interface Design are used as guidelines for designing interface improvement recommendations for the HSIS application in this study. In addition to serving as a reference for design planning, these rules can also be used for feature selection and appropriate improvements for each usability issue in the HSIS mobile application.

Data Collection

This study involved three-stage data collection process, including the distribution of survey questionnaires, the first phase of UT, and the second phase of UT. The target numbers of respondents were 14, with a proportion of 7 participants from the questionnaire survey and the other 7 from the new HSIS users. The distribution of the number of respondents for each data collection method can be seen in Table 7. Based on research comparing the results of various usability testing questionnaires, the range of participants for valid SUS questionnaire results were between 6 and 14 samples [13]. Both usability testing phases followed the same data collection flow, with respondents divided into two categories: new HSIS application users and HNI agents who had used the application for a certain period.

Table 7. The Mapping of Participants

Method	Participants
Usability Testing (HSIS testing based on task scenario) and interview	14 participants
System Usability Scale (SUS) and Open-ended Question	81 participants

Data Processing

After data collection through SUS questionnaires, usability testing, and the think-aloud process, the researcher analyzed the obtained data. Qualitative data analysis was conducted first by categorizing and coding the components from the task scenario instrument, interviews, and open-ended questions. Meanwhile, for the quantitative data, SUS scores were processed based on the SUS scoring formula from the questionnaire respondents. The results were then mapped according to the grade and percentile range of the SUS scores. In addition, both quantitative and qualitative data analyses would be compared in order to determine if there was a synchronous relationship between these two types of data.

C. Result and Discussion

During the one-month survey distribution period from mid-December 2023 to January 2024, a total of 81 people completed the questionnaire. In addition, 14 respondents participated in UT Phase 1, with 7 respondents selected from the survey participants and 7 others chosen from those who had never used the HSIS application.

Respondents Demography

The SUS and OEQ questionnaire survey was completed by respondents from various categories covering general aspects; such as, gender, age, education, and occupation. The majority of survey respondents over 70% were female. The age range of respondents was divided into three groups, with the largest proportion (49.4%) aged between 25-40 years, followed by respondents over 40 years old (43.2%), and those under 25 years old (7.4%). The educational levels of respondents vary, but the average respondent have a bachelor's degree or higher, with over 50%. Meanwhile, regarding occupation, respondents are predominantly housewives that are 38% as shown in Figure 4.

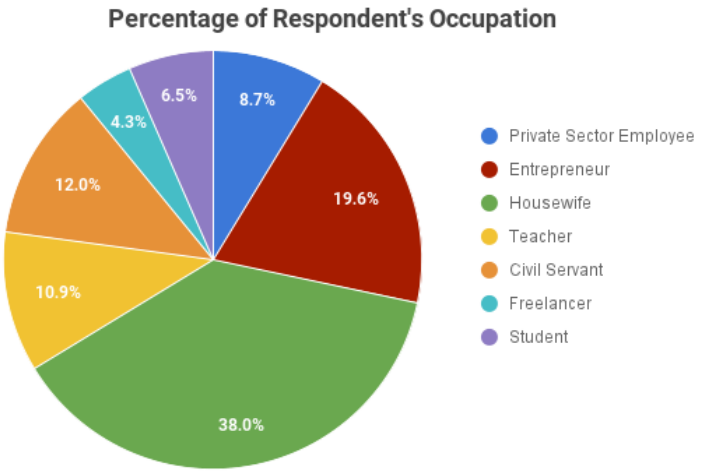

Figure 4. Survey Demographics Based on Occupation

Furthermore, there is a category for HSIS application usage based on the duration of use and the activities conducted by respondents in the HSIS application. The period of HSIS application usage is predominantly by respondents who have used it

for 3-4 years that are over 50%. Almost all respondents have used the Input Transaction feature at least once with a total respondents are 80. It is followed by activities on the Purchase and Sales Report features that are below 73. Some activities which have not been conducted by most respondents, with the lowest respondents, are Stock Agent List, Customer Entry, and Edit Transaction. The survey response diagram related to user activities in the HSIS application can be seen in Figure 5.

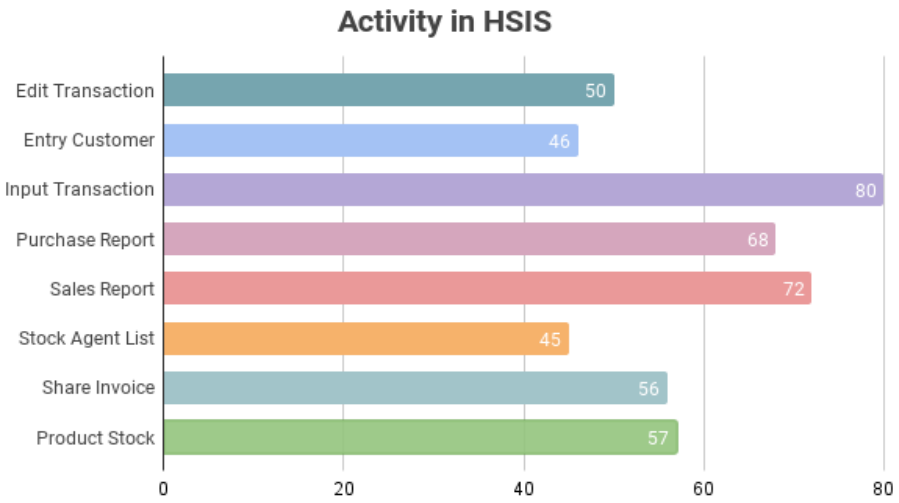

Figure 5. Survey Demographics Based on The Activity in HSIS

Implementation and Analysis of Usability Testing Phase 1 Results

The usability testing sessions were conducted individually, lasting between 10 to 30 minutes, including the task scenarios and a brief interview during the testing session. The main objective of the usability testing is to assess the system's capability, efficiency, and effectiveness; besides, to determine user satisfaction with the system [9]. The think-aloud method was used in order to encourage respondents to express their complaints, opinions, and feelings while using the HSIS application. The problem metrics from UT Phase 1 are displayed in Table 8, with each respondent represented by the codes R1-R14. R1-R7 are categorized as new HSIS application users and R8-R14 are categorized as current experienced HSIS application users. UT Phase 1 examines two aspects of completion by the participants: time completion and task completion.

The issues considered in the metric include tasks that were completed but not smoothly, and respondents who gave up while completing the tasks. As can be seen in Table 8, the tasks with the most issues, in order, are task 4, task 2, task 3, and task 8. Task 4 involves the scenario of editing a previously entered transaction in the HSIS application, task 2 involves the scenario of searching for the nearest stock agent in the current domicile, task 3 involves entering a new transaction, and task 8 involves logging out of the HSIS application. In addition to task completion, the researcher analyzed time completion or the time it took respondents to complete each task. Tasks which are completed above the average time are considered issues for the respective respondent category.

Table 8. UT Phase 1 Result

Task(s)/Respondent	*Task* 1	*Task* 2	*Task* 3	*Task* 4	*Task* 5	*Task* 6	*Task* 7	*Task* 8
R1	22	49	115	217	13	22	70	12
R2	20	34	70	175	21	7	30	11
R3	53	128	179	260	40	5	77	168
R4	33	52	237	190	35	21	35	8
R5	28	49	270	223	24	4	21	4
R6	10	58	151	181	12	42	58	9
R7	36	78	200	164	20	13	31	17
R8	10	25	142	191	19	13	97	18
R9	10	139	112	201	13	5	112	92
R10	10	30	47	228	17	10	65	10
R11	10	17	25	118	10	6	41	6
R12	10	57	134	496	15	17	107	12
R13	10	65	79	114	10	7	95	6
R14	10	59	182	122	17	4	40	8
New Users	27,88	68,76	167,76	189,88	22,25	17,375	42,75	29
Old Users	10,00	56,00	103,00	210,00	14,43	8,86	79,57	21,71
Total	19,43	60,00	138,79	205,71	19,00	12,57	62,79	27,21
Total Issues	-	3	2	10	-	-	-	2

Legend:

	Success and Completed
	Success, but not Completed
	Not Success

From all the usability issues analyzed based on qualitative data, the researcher categorized the issues according to components in the usability guidelines, which are derived from various standards and categories [14]. The usability issues from UT Phase 1 were grouped into several categories. As shown in Figure 6, the analysis results indicate that issues in the Page Layout and Navigation category are 39.3% while Accessibility and Compatibility are 35.7%. The Headings, Titles, and Icons category are 14.3%, and the Text Appearance and List category are 10.7%. The majority of respondents encounter issues in the Page Layout and Navigation category.

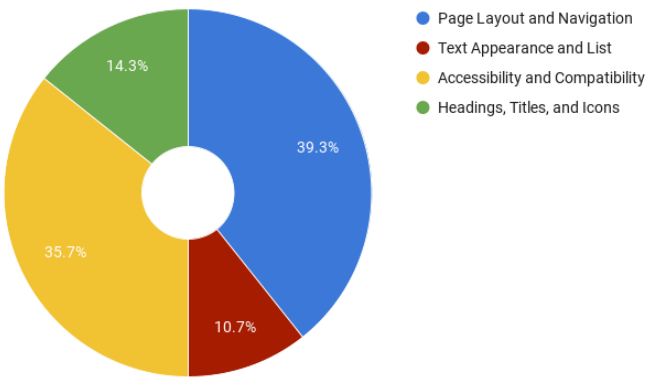

Figure 6. Usability Testing Result based on Category

Analysis of System Usability Scale (SUS) Questionnaire Results

The System Usability Scale (SUS) questionnaire was part of the survey component completed by 81 respondents. The SUS results provide a quantitative analysis of the research findings. Respondents were asked to answer 10 statements by selecting one of the five scales provided for each statement, ranging from Strongly Agree to Strongly Disagree. After calculating the SUS scores for each respondent, the average SUS score for the HSIS application was found to be 73.86 as can be seen in Table 7, with the lowest score is 40 and the highest score is 100.

Table 7. Results of SUS Questionnaire Calculation

Respondent	1	2	3	4	5	6	7	8	9	10	SUS Score
R1	3	4	3	4	3	4	4	4	4	1	85
R2	2	3	3	1	4	2	3	3	2	0	57,5
R3	3	3	3	4	3	3	1	4	3	1	70
R4	2	3	2	3	2	3	2	3	2	2	60
R5	4	4	4	4	4	4	4	4	4	0	90
R6	4	3	4	4	4	4	4	3	4	3	92,5
R7	4	3	3	2	2	2	2	3	2	3	65
R8	4	4	4	3	4	4	4	4	4	1	90
R9	4	4	4	3	3	4	4	3	3	1	82,5
…	…	…	…	…	…	…	…	…	…	…	…
R81	4	3	3	2	3	3	3	3	3	1	70
Avg.	3	3	3	3	3	3	3	3	3	2	73.86

Based on the SUS grade and adjective range a score of 73.86 are categorized into grade B- and the adjective rating of Good. According to the SUS score range standards in Table 9, a score of 73.86 is above the average SUS score of 68. However, there are still several areas which can be improved in order to make the HSIS application better.

Table 9. Interpretation of SUS Results

Grade	SUS Score	Percentile Range
A+	84,1 – 100	96 - 100
A	80,8 – 84	90 - 95
A-	78,9 - 80,7	85 - 89
B+	77,2 - 78,8	80 - 84
B	74,1 - 77,1	70 - 79
B-	72,6 - 74,0	65 - 69
C+	71,1 - 72,5	60 - 64
C	65,0 - 71,0	41 - 59
C-	62,7 - 64,9	35 - 40
D	51,7 - 62,6	15 - 34
F	0 - 51,6	0 - 14

Analysis of Open-ended Question (OEQ) Results

The analysis of the OEQ results follows the same qualitative data method as in UT Phase 1. The analysis was conducted on two sets of data from the OEQ data collection process: the survey and the interviews following the usability testing. The results from the OEQ questionnaire survey analysis can be seen in Figure 7, which shows that the categories are Organization and Information Contents at 36.5%, and Accessibility and Compatibility at 28.6%. Meanwhile, Page Layout and Navigation is at 22.2%, Text Appearance and List at 7.9%, and Headings, Titles, and Icons at 4.8%.

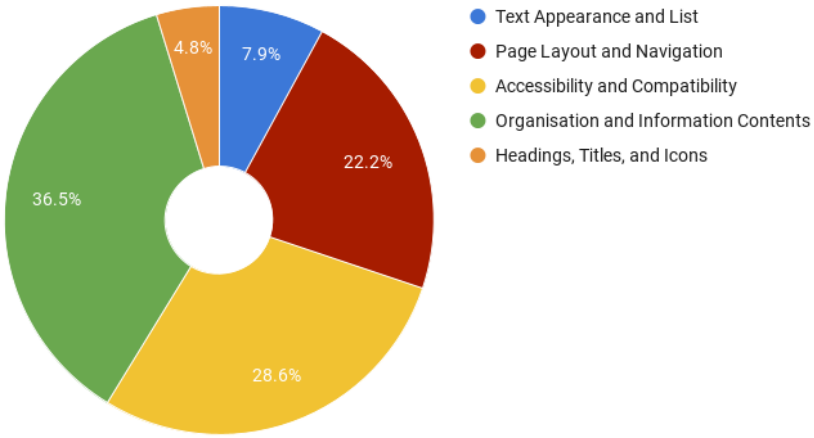

Figure 7. Categories of OEQ Results from Questionnaire Survey

The results from the OEQ interview analysis can be seen in Figure 8, which shows that the categories are Page Layout and Navigation at 39.1%, and Organization and Information Contents at 21.7%. In addition, Accessibility and Compatibility and Text Appearance and List both are at 17.4%. Headings, Titles, and Icons have a percentage of 4.3%.

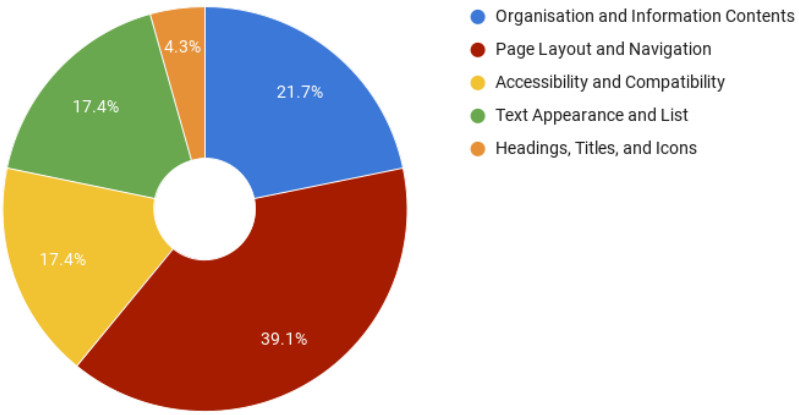

Figure 8. Categories of OEQ Results from Interviews

Discussion of Qualitative and Quantitative Results Analysis

After conducted analysis by using both qualitative and quantitative methods, the quantitative evaluation yielded a SUS score of 73.86% with a total of 81 respondents. Based on the SUS score, the HSIS application is categorized into the B-grade and it is rated as good. Although above average, there is still space for

improvement in the HSIS application. For the qualitative data analysis, the researcher summarized the results in the form of diagrams from three separate instrument categories. The results were taken from UT Phase 1, which involved 16 respondents by using the think-aloud method and task completion. These results were then combined and processed with the outcomes from the OEQ survey and interviews.

The summary of overall usability issues is represented in the usability category diagram in Figure 9, with the highest percentage in the Organization and Information Contents category at 25%. This category includes issues; such as, incomplete content, unsaved consumer data, agent addresses not displaying, and other content arrangement problems in the application. The second category is Page Layout and Navigation with 22.6%, covering issues; such as, screen display requiring scrolling, empty pages, and complex workflows. The next category is Accessibility and Compatibility at 22.6%, with issues including differences between the HSIS mobile app and website features, hidden features, or the absence of certain features needed by users. The fourth category is Text Appearance and List at 19.4%, covering issues; such as, inappropriate wording, invoice numbers which cannot be copied, and so on. The final category is Headings, Titles, and Icons at 9.7%, involving issues related to icons, text size, and other related problems.

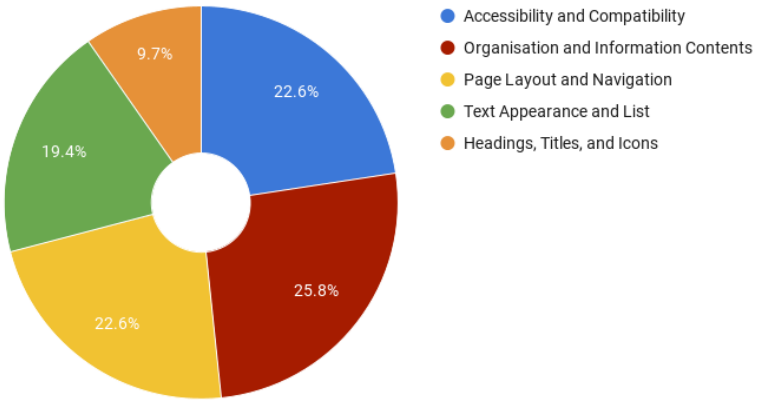

Figure 9. Summary of Usability Issue Categories

The results from both qualitative and quantitative analyses indicate that the HSIS application needs improvement. Moreover, enhancements are needed for existing features, adding features which should be present in the HSIS mobile application, and adjusting the layout of several pages. The researcher proposes improvements through a design prototype which the company can use when considering changes to the current HSIS application. The summary of usability issues from UT Phase 1 and OEQ serves as the basis for designing this prototype.

Design and Evaluation of the Prototype

After processed the data and summarizing usability issues from the OEQ survey, OEQ interviews, and UT Phase 1, a total of 31 usability problems are identified for the HSIS mobile application. These issues are also grouped into five categories: Accessibility and Compatibility, Page Layout and Navigation, Organization and Information Contents, Text Appearance and List, and Headings, Titles, and Icons.

Table 10. Recommendations List of Design Solutions

Function	Usability Issues	Design Solution	Rules of Interface Design
Homepage	1. The users are still unable to access information about HNI, the HSIS user guide, and issue reports 2. The wording used for reports are 'Sales' and 'Purchases'	1. Adding the HANI Chatbot feature in order to provide information about HNI and the HSIS 2. Adding the wording 'Report' for Sales and Purchases	1. Help and documentation 2. Support internal locus of control 3. Match Between System and The Real World
Sales	1. The sales table is extended horizontally beyond the page 2. The Edit Transaction icon is hidden 3. It only displays the transaction list, but it does not provide a summary of increases and decreases during a specific period 4. Unable to copy the Invoice ID	1. Fit the appearance of the Sales Reports table. 2. Display the Edit Transaction icon clearly at the top of page 3. Show trend graphs of increases or decreases on the sales page 4. Make the Invoice ID copyable	1. Recognition rather than Recall 2. User Control and Freedom 3. Enable frequent users to use shortcuts
Transaction	1. The user has to repeatedly enter the data of subscription consumers 2. The user should enter the initial letter of the product name to correctly display the corresponding list 3. Stock agents must switch pages to select the payment method 4. Stock agents must repeatedly enter the transaction amount 5. The user is only shown the product stock after clicking add product, and PV displays in the format ".000"	1. Display a list of transaction history of consumers 2. Provide ease for users in searching for product names during transaction input 3. Display the payment method as a dropdown list of options 4. Automatically calculate and display the total amount 5. Show the stock amount and display PV as whole numbers without trailing zeros	1. Flexibility and Efficiency of Use 2. Error Prevention 3. Reduce Short-term Memory Load 4. Visibility of System Status
Stock Agent List	The user must click the Search or Filter button to view the list of stock agents	Directly display the list of stock agents when the user accesses the Stock Agent List page with valid details	1. Visibility of System Status 2. Strive for Consistency
Others	1. The filter is limited to one month only, the user cannot filter the list by months 2. The Logout button is hidden in the profile page 3. The user profile is just a round icon and cannot be changed	1. Allow users to filter based on the specific period, whether yearly or monthly. 2. Display the Logout button in the Homepage 3. Enable users to change their profile picture	1. Offer informative feedback 2. Cater to Universal Usability 3. User control and freedom

Subsequently, all user needs were summarized into improvement solutions. The recommendations for improving the HSIS application interface design were prioritized based on the frequently occurring issues identified in the study. These recommendations are based on Nielsen's Ten Usability Heuristics of Interface Design and Shneiderman's Eight Golden Rules of Interface Design. From the usability analysis, the improvement recommendations are created based on the issues identified from the OEQ and UT Phase 1.

Table 11. Comparison of UT Phase 1 and UT Phase 2 Results

Respondent	Usability Testing	T1	T2	T3	T4	T5	T6	T7	T8
R1	1								
	2								
R2	1								
	2								
R3	1								
	2								
R4	1								
	2								
R5	1								
	2								
R6	1								
	2								
R7	1								
	2								
R8	1								
	2								
R9	1								
	2								
R10	1								
	2								
R11	1								
	2								
R12	1								
	2								
R13	1								
	2								
R14	1								
	2								
Total Issues	1		3	2	10				2
	2				3				1

Legend:

Success and Completed

Success, but not Completed

Not Success

Some of the improvement recommendations are design solutions which can address multiple usability problems simultaneously. From the recommendations, some of the design solutions aim to resolve a combination of usability issues. The recommendations are prioritized according to the frequency of usability issues identified in the research instruments can be seen in the Table 10. The prototype resulting from the HSIS application interface design improvements was then tested again with the same respondents from UT Phase 1. UT Phase 2 involved testing the design prototype using an unmoderated method and using links from Maze. The results from UT Phase 2 were compared with those from Phase 1. The results in the table show a significant reduction in the number of issues between Phase 1 and Phase 2, with better outcomes in the Task Scenario activities conducted by the respondents; for example, Tasks 2 and 3, which initially had 3 and 2 usability issues respectively, face no problems at all in the second phase. The comparison of results between Phase 1 and UT Phase 2 can be seen in Table 11.

Overall, the results from UT Phase 2 show better outcomes in the Task Scenario activities conducted by the respondents. It indicates that the recommended interface design improvements have led to an increase in the usability of the prototype compared to the initial design tested in UT Phase 1.

D. Conclusion

This study used mixed-methods approach which combined both qualitative and quantitative aspects, where data was collected through the SUS questionnaire, open-ended questions, usability test, and the think-aloud process. The results from UT Phase 1 conducted with 14 respondents show that most respondents encounter issues in the Page Layout and Navigation category. The user requirements questionnaire and SUS scale yielded a score of 73.86 from respondents which are categorized into grade B- and has a "Good" adjective rating. According to SUS score range standards, this score is above the average SUS score of 68. After processing the data and summarizing usability issues from the OEQ survey, OEQ interviews, and UT Phase 1, a total of 31 usability problems were identified for the HSIS mobile application. Each improvement recommendation for every usability issue is detailed according to each category which results in 14 recommendations based on problems identified from the OEQ and UT Phase 1. Some of these recommendations are design solutions which address multiple usability issues within a single solution.

The interface design improvement recommendations based on user requirements are implemented into a high-fidelity prototype designed in order to provide solutions to needs and facilitate the use of the HSIS application. The prototype resulting from these interface design improvements was then tested again with the same respondents from UT Phase 1. The results show a significant reduction in the number of issues between Phase 1 and Phase 2, with better outcomes in the Task Scenario activities conducted by the respondents. It indicates that the recommended interface design improvements have led to an increase in the usability of the prototype compared to the initial design tested in UT Phase 1.

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F. References

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