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Usability Test on the System Determination Decision Support Release Product Towards Contribution Level Decision Maker

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ABSTRACT

The core problem addressed in this research is the usability challenges of a decision support system for determining product release, which can hinder decision-makers' effectiveness and user satisfaction. **The purpose** of this research is to evaluate the usability of the system and assess its impact on the effectiveness of decision-makers in determining product releases. **The method** used is a usability test involving direct user interaction with the system, where decision-makers performed predefined tasks. Usability metrics, including task completion time, error rate, and user satisfaction levels, were collected and analyzed to evaluate system performance. **The result** of this study is that the system facilitates efficient decision-making to a moderate extent. However, specific usability issues, such as navigation complexity and information overload, were identified, which reduced some users' ability to operate the system seamlessly. Improvements in navigation and information presentation significantly enhanced user experience and decision-making quality. **The research concludes** that enhancing the usability of decision support systems is essential for maximizing their contribution to decision-making processes. Addressing specific challenges, such as simplifying navigation and optimizing information presentation, can substantially improve decision-maker satisfaction and the overall utility of the system. This study emphasizes the importance of usability-focused design in facilitating effective organizational decision-making.

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1. INTRODUCTION

Decision Support Systems (DSS) are essential tools designed to assist decision-makers in navigating complex or unstructured situations by processing large volumes of data and generating actionable insights for informed choices [1]. These systems have become increasingly vital across various domains such as healthcare, business, e-governance, and supply chain management, where decisions often involve analyzing vast datasets under time constraints and considering multiple variables [2]. In these contexts, DSS plays a crucial role in enhancing operational efficiency, reducing errors, and aligning decisions with organizational goals and dynamic market condition [3]. Despite their widespread adoption, challenges persist in fully optimizing DSS to support complex decision-making processes. Usability issues—such as non-intuitive interfaces, complex navigation, and limitations in delivering timely information—continue to hinder the effectiveness of DSS and reduce user satisfaction [4]. In the business sector, DSS supports organizations in maintaining competitiveness by enabling real-time data-driven decision-making. For instance, decision-makers involved in product release scenarios rely on DSS to assess market trends, analyze consumer preferences, and prioritize features that contribute to successful outcomes [3]. Similarly, in the public sector, DSS facilitates evidence-based policymaking by integrating diverse datasets to help government agencies address societal challenges more effectively [4]. However, previous studies have shown that usability remains a significant barrier to maximizing the potential of DSS, particularly when interfaces are not aligned with user needs or cognitive workflows [5]. Therefore, improving the usability of DSS is critical to ensuring its effective integration into real-world decision-making environments.

While several studies have explored usability testing in different domains, this research distinguishes itself by evaluating not only the usability of a DSS but also its impact on the effectiveness and efficiency of real-time decision-making. For example, usability evaluations of e-tourism systems identified issues related to IT infrastructure and information dissemination, especially in rural areas [4]. Additionally, Mandiri Online was assessed using the System Usability Scale (SUS), achieving a score of 79.6, indicating good usability while highlighting the need for interface improvements and additional features [5]. The UII Skin Analyzer application underwent usability testing using Cognitive Walkthrough and SUS, scoring 82.6%—a result categorized as very good—with recommendations for enhancing the user interface and experience [6]. Unlike these studies, which focus primarily on interface design and general usability, this research integrates contextual user requirements and addresses challenges in unstructured decision-making environments. Moreover, studies on the DutaTani portal employed SUS and Importance Performance Analysis (IPA) to identify usability **gaps**, such as interaction design issues, which hindered user satisfaction [7, 8]. **The primary** objective of this study is to evaluate the usability, effectiveness, and efficiency of a DSS in supporting complex decision-making scenarios [9]. Specifically, the research aims to identify usability challenges in existing DSS interfaces that hinder decision-making processes, assess the system's contribution to decision-makers' performance in real-time scenarios, develop a comprehensive framework for usability improvement, and provide actionable recommendations for system enhancement. To achieve these objectives, the study employs a mixed-methods approach, combining quantitative usability metrics such as task completion time and error rate with qualitative feedback from post-task interviews and surveys [10]. The research methodology includes usability testing with 50 experienced decision-makers who performed predefined tasks that reflect real-world product release decision-making. The results will offer valuable insights into how usability improvements can significantly enhance the utility and acceptance of DSS in practical settings.

The novelty of this study lies in the development of a systematic usability testing procedure combined with an evaluation of the DSS's ability to support real-time decision-making. This area has not been thoroughly explored in prior research. This holistic approach ensures that DSS can meet the evolving demands of dynamic decision-making environments. The primary objective of this research is to evaluate the usability, effectiveness, and efficiency of a DSS in supporting complex decision-making scenarios. Specifically, the study aims to identify usability challenges in existing DSS interfaces, assess the system's contribution to decision-maker performance, develop a comprehensive framework for usability improvement, and provide actionable recommendations for system enhancement. By addressing these objectives, this research **contributes** to the growing body of knowledge on how usability-focused design can significantly enhance the utility and acceptance of DSS in practical settings.

2. RESEARCH METHOD

The usability testing in this research focuses on a single DSS specifically designed for product release decision-making. The DSS program tested includes features such as data analysis tools, decision modeling, and real-time information processing, tailored to support decision-makers in complex and dynamic scenarios. The choice to focus on a single DSS was made to ensure a detailed and comprehensive evaluation, providing precise insights into its usability and functionality. Fifty participants were involved in the usability testing, carefully selected based on their roles as decision-makers with experience in handling organizational decision-making processes. This ensures that the feedback and usability metrics gathered, such as task completion time, error rate, and user satisfaction, are both relevant and actionable. The testing involved predefined scenarios that mimicked real-world decision-making tasks to evaluate the system's effectiveness, efficiency, and user satisfaction levels.

The research methods in this study involve a structured flow designed to evaluate and enhance the usability of the DSS (see Figure 1) [11]. This study adopts a sequential methodology encompassing data collection, system analysis, usability testing, and system refinement stages. Each stage aims to ensure that the system supports decision-making processes effectively and efficiently. The method used in this study is a usability testing framework integrated with heuristic evaluation and complemented by various quantitative and qualitative approaches [12]. This study introduces a novel approach to evaluating DSS by combining systematic usability testing with an assessment of the system's ability to support real-time decision-making. Unlike previous research, this methodology focuses on both the functional capabilities and user experience of DSS, especially in complex and dynamic environments such as product release decision-making. The research aims to evaluate the usability, effectiveness, and efficiency of a DSS, with specific attention to identifying interface-related challenges that may hinder decision-making processes. Furthermore, it aims to evaluate how effectively the system supports decision-makers in real-world scenarios and to develop a comprehensive framework for enhancing usability. By addressing these objectives, the study contributes valuable insights into how user-centered design can enhance the practical utility and acceptance of DSS.

The usability testing involved 50 experienced decision-makers who performed predefined tasks designed to reflect real-life scenarios of product release decision-making. These participants were carefully selected based on their professional roles and experience in organizational decision-making, ensuring that the feedback collected would be relevant and actionable. Usability metrics, including task completion time, error rate, and user satisfaction levels, were recorded to assess system performance objectively. This approach allowed researchers to gather both qualitative and quantitative data, providing a well-rounded understanding of the DSS's strengths and limitations. The results are expected to highlight how usability improvements can significantly increase the system's adoption and effectiveness in practical settings. The research methodology follows a structured flow aimed at systematically evaluating and enhancing the usability of the DSS. It includes sequential stages: data collection, system analysis, usability testing, and system refinement. Each stage was designed to ensure that the DSS effectively and efficiently supports decision-making processes. This step-by-step approach allows for iterative improvements based on real user interactions and feedback. By following this process, the study ensures a thorough evaluation of the system while maintaining a focus on practical application in business contexts.

A key component of the methodology is the integration of heuristic evaluation with a usability testing framework supported by both quantitative and qualitative techniques. Specifically, the SUS was used to measure overall system usability through standardized scoring. IPA helped identify and prioritize areas needing improvement based on user feedback. Additionally, cognitive walkthroughs were conducted to examine potential issues in user-system interaction, offering insight into the system's usability from a behavioral perspective. These methods together provide a comprehensive view of the DSS's functionality and user experience. To collect detailed data, multiple techniques were employed during the usability testing phase. Structured post-test surveys captured participants' subjective impressions of the system's ease of use and overall satisfaction. Researchers also conducted direct observations during test sessions to record errors, delays, and areas where users encountered difficulties. Semi-structured interviews were conducted with selected participants to gain a deeper understanding of their experiences and perceptions. Finally, system metrics—such as interaction times, error rates, and task completion rates—were automatically logged to provide objective performance indicators. Combining these methods ensured a rich and multi-dimensional dataset for analysis. These methodological choices reflect the study's commitment to a holistic and user-centered evaluation of Decision Support Systems. By integrating diverse research tools and focusing on real-world applications, the study not only identifies current usability issues but also offers actionable recommendations for future improvements. This approach enhances the relevance of the findings for both system developers and decision-makers who rely on DSS for critical business decisions. Ultimately, the methodology supports the development of more intuitive, efficient, and effective decision support systems tailored to the needs of modern organizations.

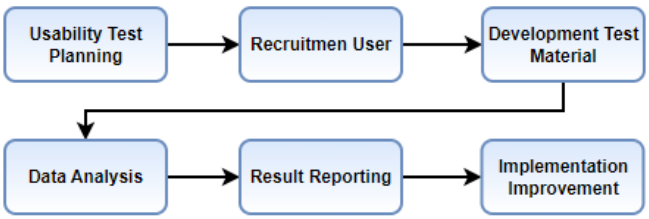

Figure 1. Stages Study

The first stage in the usability testing process is planning, which involves several key steps to ensure the test is well-structured and aligned with research goals. Initially, the objectives of the usability test must be clearly identified, including the specific research questions that the study aims to answer. This helps guide the entire testing process and ensures that relevant data is collected. Next,

the target group of users is determined based on their relevance to the system being tested, ensuring that participants represent actual or potential end-users. Following this, realistic task scenarios are created that reflect typical use cases and decision-making contexts within the system. The methods for collecting data—such as observation, surveys, or interviews—are then selected to capture both qualitative and quantitative insights. Finally, logistical aspects such as location, time, and resources required for conducting the usability tests are planned to ensure smooth execution. Once the planning phase is complete, the next step is user recruitment, which involves selecting suitable participants for the usability test. This begins by defining clear criteria for user selection, ensuring that individuals match the characteristics of the intended user group. These criteria may include experience in decision-making roles, familiarity with similar systems, or specific job functions related to the system's purpose. The recruitment process can involve either internal selection, such as choosing employees who regularly make decisions using such tools, or external sourcing from outside the organization. Ensuring a diverse participant pool enhances the validity of the findings by incorporating a range of perspectives and experiences, ultimately leading to more comprehensive insights into usability.

The third stage involves developing test materials, which are essential for guiding participants through the usability testing process. This includes preparing task scenarios, survey questions, interview guides, and any other tools needed to collect data effectively. These materials must be clearly designed and align with the research objectives to prevent confusion and ensure consistency in responses. Before finalizing the materials, they are typically pilot-tested with a small group of individuals to verify their clarity and appropriateness. This pre-testing phase enables researchers to refine instructions, tasks, and questions so that they accurately reflect the study's goals and are easily understood and followed by participants. During the implementation phase, usability testing is conducted with selected participants under controlled conditions. Participants are welcomed and given a clear explanation of the test's purpose to help them feel comfortable and focused. They are then instructed to perform predefined tasks while interacting with the DSS. Researchers observe each session closely, documenting how users interact with the system, noting any difficulties or delays encountered. If possible, these sessions are recorded for later review and analysis. Additionally, post-task surveys or interviews may be administered to gather direct feedback from users regarding their experiences, challenges, and suggestions for improvement.

After the usability sessions are completed, the collected data undergoes thorough analysis to extract meaningful insights. This includes reviewing observational notes, video recordings, survey responses, and interview transcripts to identify patterns, common issues, and areas of strength within the system. Particular attention is given to problems users faced during task completion, such as navigation difficulties or misunderstanding of interface elements. Key findings are summarized, and recommendations are formulated to address usability barriers and enhance the system's functionality. If recordings were made, they are reviewed in detail to gain a better understanding of user behavior and emotional reactions, providing deeper context for the quantitative data gathered. Once the analysis is complete, the findings are compiled into a comprehensive report that outlines the results of the usability test along with actionable recommendations. This report serves as a valuable reference for stakeholders, including developers, designers, and management teams responsible for improving the DSS. The findings are shared with relevant parties to facilitate informed discussions about necessary changes. Collaborative meetings are often held to explore the best ways to implement improvements and prioritize features that enhance the system's usability and effectiveness in supporting decision-making processes. The final stage in the usability testing cycle is the implementation of improvements based on the insights gained. Developers and designers collaborate to implement targeted modifications to the system, addressing usability issues identified during testing. Once changes have been made, the system is retested to validate that the enhancements have successfully improved the user experience and resolved prior issues. This iterative approach ensures that the Decision Support System continues to evolve in alignment with user needs and expectations, ultimately contributing to more efficient and effective decision-making in real-world applications.

3. RESULT AND ANALYSIS

The usability testing methodology employed in this study integrates both qualitative and quantitative approaches to evaluate the DSS comprehensively. The testing involved predefined tasks reflecting real-world decision-making scenarios, such as analyzing product release data, selecting decision criteria, and comparing alternative strategies. These tasks were designed to assess whether the DSS's functionalities effectively support decision-making. Usability metrics, including task completion time, error rate, and user satisfaction levels, were used to quantify system performance. Additionally, qualitative feedback was gathered through post-task interviews to understand user perceptions of the system's interface, navigation, and information presentation. The dashboard presented in Figure 2 is part of a Product Release DSS, designed to enhance decision-making processes through usability-focused design. The primary purpose of this dashboard is to provide decision-makers with a clear and concise overview of key performance metrics and recent activities related to product release decisions. At the top, the dashboard highlights critical usability metrics: the Task Completion Rate stands at 89%, indicating that users are completing tasks within the system. Additionally, the User Satisfaction Score (SUS) is reported at 82.5%, indicating a generally positive user experience based on the System Usability Scale. The Average Task Time is noted as 4 minutes and 22 seconds, suggesting that users can efficiently complete tasks within a reasonable timeframe.

Below these metrics, the dashboard features a section titled Recent Activities, which provides real-time updates on significant actions taken within the system. This includes notifications such as ”New product analysis completed: SmartWatch X1,” signaling the successful completion of an analysis for a specific product. Another activity listed is ”Usability feedback submitted by user ♯12,” indicating that user feedback has been collected, which is crucial for the continuous improvement of the system’s usability. Furthermore, the dashboard shows that the market trend visualization has been updated, ensuring that decision-makers have access to the latest data insights. Lastly, it mentions that the priority level for ”EcoPhone Z” has been updated, highlighting dynamic changes in product prioritization that may influence decision-making strategies Overall, this dashboard serves as a central hub for monitoring system performance and staying informed about recent developments, thereby supporting decision-makers in making timely and well-informed choices regarding product releases. Its design emphasizes clarity and efficiency, aligning with the usability-focused approach outlined in the research.

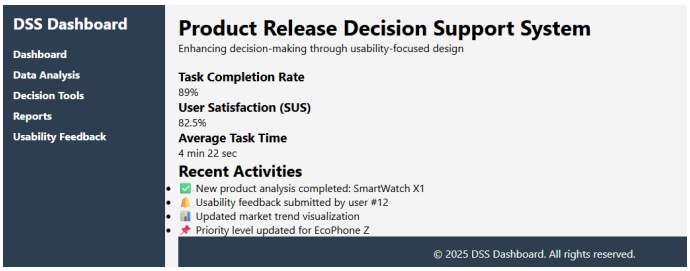

Figure 2. Dashboard Page of DSS

The Data Analysis page is shown in Figure 3. It was designed to provide decision-makers with a comprehensive overview of product release metrics, market trends, and customer feedback, supporting informed decision-making. At the top, users can filter data by selecting specific products or market trends using dropdown menus, allowing for targeted analysis. The main section, titled Product Release Metrics, presents a table that lists key details for each product, including its name, current market trend (e.g., ”High Demand,” ”Moderate,” or ”Rising”), customer feedback score, launch date, priority level (”High” or ”Medium”), and an option to view more detailed information via a ”View Details” link.

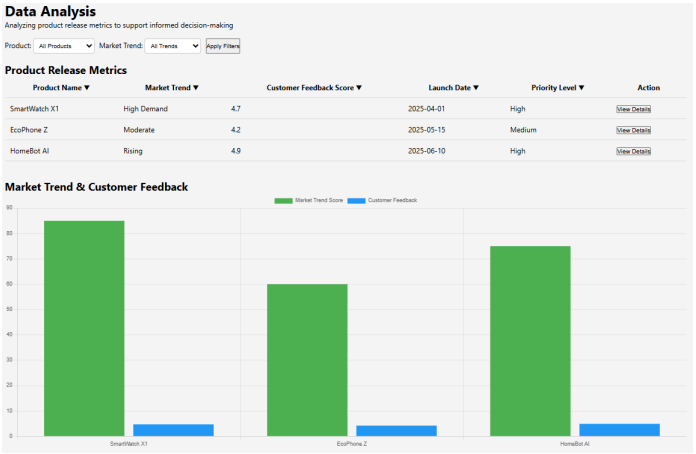

Figure 3. Data Analysis Page

Below the table, the Market Trend & Customer Feedback section features a bar chart that visually compares two critical metrics: Market Trend Score (represented in green) and Customer Feedback (represented in blue) for each product. This visualization helps decision-makers quickly assess how well a product aligns with market demand and customer satisfaction. For example, the chart shows that SmartWatch X1 has a high market trend score but relatively low customer feedback, indicating strong market interest but room for improvement in user satisfaction. In contrast, HomeBot AI demonstrates both a rising market trend and high customer feedback, suggesting it is performing well across both dimensions. This integrated approach ensures that decision-makers have access to actionable insights at a glance, enabling them to prioritize resources effectively and make strategic decisions based on real-time data.

The Decision Tools page is shown in Figure 4. It was designed to support informed decision-making by providing structured analysis and prioritization tools for product release decisions. The primary feature on this page is the Prioritize Your Product Release section, which allows users to evaluate and prioritize products based on key criteria such as Budget, Timeline, Risk Level, Market Demand, and Customer Feedback. Each criterion is represented by a horizontal bar chart, where the length of the blue bar indicates the score assigned to that factor. For example, in the provided screenshot, Customer Feedback has the highest score (8), followed by Market Demand (7), while Budget and Timeline are both scored at 5, and Risk Level is also rated at 5.

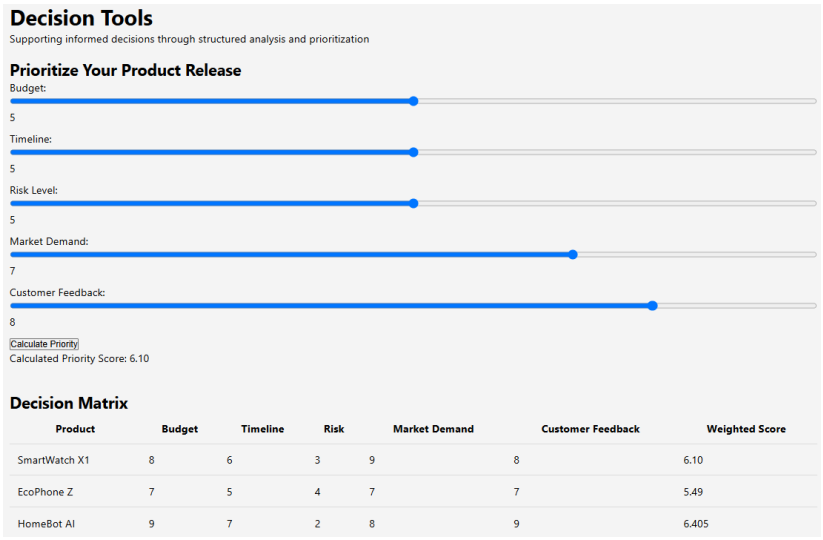

Figure 4. Decision Tools Page

Below the prioritization tool, a Decision Matrix consolidates these scores into a weighted priority system. The matrix lists three products—SmartWatch X1, EcoPhone Z, and HomeBot AI —along with their respective scores for each criterion. These individual scores are then combined to calculate a Weighted Score for each product, reflecting its overall priority level. In the example shown, HomeBot AI has the highest weighted score (6.405), followed by SmartWatch X1 (6.10), and then EcoPhone Z (5.49). This structured approach enables decision-makers to objectively compare products based on multiple factors, facilitating more informed and data-driven prioritization of product releases. The Decision Tools page is shown in Figure 5. It is designed to support informed decision-making by providing structured analysis and prioritization tools for product release decisions. The primary feature on this page is the ”Prioritize Your Product Release” section, which allows users to evaluate and prioritize products based on key criteria, including budget, Timeline, Risk Level, Market Demand, and Customer feedback. Each criterion is represented by a horizontal bar chart, where the length of the blue bar indicates the score assigned to that factor. For example, in the provided screenshot, Customer Feedback has the highest score (8), followed by Market Demand (7), while Budget and Timeline are both scored at 5, and Risk Level is also rated at 5.

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The results of conducting a survey show that the DSS successfully supports decision-making in most scenarios, with an average task completion rate of 89% and a user satisfaction score of 82.5% based on the System Usability Scale (SUS). However, some functionalities require improvement. For instance, 35% of participants found the navigation structure to be complex, and information overload in certain sections hindered efficient decision-making. These findings indicate that while the DSS has robust capabilities for data analysis and decision modeling, its usability in terms of interface simplicity and information clarity needs further refinement to ensure seamless support for decision-makers. Additionally, the Importance Performance Analysis (IPA) indicates that certain features, such as data visualization tools and real-time decision support functionalities, are highly prioritized by users but currently underperform in terms of usability and ease of access.

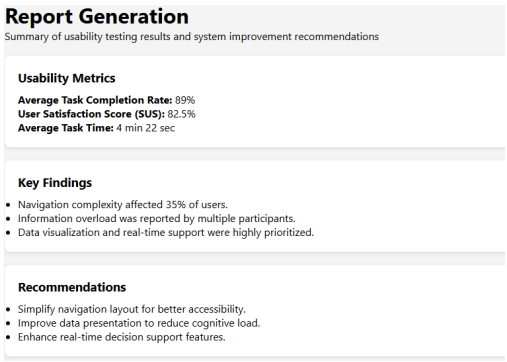

Figure 5. Report Page

Each finding can be interpreted as follows: the moderate usability rating suggests that while the DSS prototype meets some baseline functionality, its interface complexity could hinder decision-makers in critical, real-time scenarios. Navigation issues imply that users require a more streamlined layout for quick access to essential information, highlighting the need for a user-centered design approach in DSS development. The prioritization of data visualization tools and real-time functionalities by users reflects the importance of these elements in aiding complex decision-making [13, 14]. This finding highlights the importance of clear and accessible data in supporting informed decisions, suggesting that future DSS designs should prioritize these areas. The results of this research align with and support previous studies on usability testing in decision support systems, particularly those focusing on usability metrics. Studies by De Giorgio et al and Daniati & Utama found that navigation complexity and data accessibility were critical factors influencing DSS usability, confirming the importance of these aspects identified in this study [15, 16]. Similarly, research highlighted the need for improved data visualization and real-time functionalities in decision support tools, aligning with the user priorities identified through the IPA method in this study. These consistencies across studies provide a strong justification for prioritizing interface simplification and data visualization improvements in the development of DSS. A comparison of this study's findings with previous research is summarized in Table 1.

Table 1. Comparison of The Study's Findings with Previous Research

Feature	Findings in This Study	Previous Research Findings
Navigation Complexity	Users face challenges in system navigation	Navigation impacts decision efficiency [17].
Data Visualization	High user priority, but underperforming	Crucial for aiding decision-making [**?**].
Real-Time Support	Users prioritize real-time support feature	Key feature in dynamic DSS environments [18].
Interface Simplicity	Need for a streamlined interface	Simplification improves user satisfaction [19].

In summary, these findings underscore the importance of a user-centered approach to DSS usability, with a focus on interface clarity, efficient navigation, and robust data presentation tools to enhance decision-making effectiveness. The usability test of a DSS aims to evaluate how effectively, efficiently, and satisfactorily users can interact with the system [20]. This type of testing is crucial to ensure that the system supports decision-makers in performing their tasks with minimal effort and maximum efficiency. The primary goal of the usability test is to assess the ease of use, efficiency, and user satisfaction associated with the DSS designed to assist decision-makers in making informed business decisions. By identifying potential usability issues, the test helps improve the overall design and functionality of the system. Ultimately, the results contribute to refining the system so that it better aligns with user expectations and real-world application needs.

One of the key methods used in this usability test is direct observation, where researchers observe users as they interact with the DSS. During this process, observers take detailed notes on user actions, including any errors made and the time taken to complete specific tasks. This method allows researchers to identify interface-related challenges and understand how users naturally navigate the system without external guidance. Observing real-time interactions provides valuable insight into areas that may require redesign or optimization. These observations are often recorded for further analysis, ensuring that no critical details are missed during the testing phase. In addition to observation, interviews are conducted with both users and managers who have experience using the system. These interviews offer participants the opportunity to share their personal experiences, opinions, and suggestions regarding the system's usability and effectiveness in supporting decision-making. Participants are asked about the convenience of using the system, its impact on decision speed and accuracy, and any frustrations they encountered. This qualitative feedback complements the observational data by offering deeper insights into user perceptions and preferences. Conducting structured interviews ensures that all relevant aspects of the user experience are captured from multiple perspectives.

Another important component of the usability test is the use of usability questionnaires, which gather standardized feedback from participants based on predefined criteria. These questionnaires typically measure various aspects of usability, such as interface clarity, task completion speed, ease of navigation, and overall user satisfaction. Standardized tools, such as the System Usability Scale (SUS), are often used to quantify usability performance across different user groups. Questions included in the questionnaire may ask users how easy it was to navigate the system, how long certain tasks took to complete, and whether the system helped them make better decisions. Collecting this data enables researchers to compare results across participants and identify trends in usability issues. An example of the questions included in the usability questionnaire is: How easy was it for you to navigate within this system? Other questions might include: How long did it take you to complete a specific task?, To what extent did the system help you make the right decision?, and Did you feel comfortable while using the system? These types of questions are designed to gauge both subjective user experiences and objective performance metrics. The responses collected through the questionnaire provide a comprehensive overview of the system's strengths and weaknesses. Analyzing this data enables researchers and developers to prioritize improvements that enhance the overall user experience and effectiveness of the DSS in real-world decision-making scenarios.

Selecting respondents who meet specific criteria is essential to ensure that usability testing generates meaningful and actionable insights for system development and improvement. When participants are chosen based on their relevance to the system's intended use, the feedback they provide becomes more accurate and valuable. These respondents should represent actual or potential end-users, particularly those involved in decision-making processes related to the system. Their input helps identify usability issues that directly impact real-world usage and highlights opportunities for enhancing system functionality. Therefore, careful selection of test participants plays a crucial role in the overall success and reliability of usability testing outcomes. Usability can be measured through several key components, one of which is learnability, also known as convenience comprehension. Learnability refers to the speed at which users can become proficient in using a system and perform desired tasks with ease. A system with high learnability allows users to understand its functions and features without requiring extensive training or guidance. This is especially important in DSS, where efficiency and accuracy are critical for effective decision-making. High learnability contributes significantly to user satisfaction and reduces the likelihood of errors during system operation.

Another important usability component is efficiency, which measures how effectively users can achieve their goals within the system. Efficiency relates to the amount of time, effort, and cognitive resources required to complete tasks accurately and completely. A highly efficient system enables users to accomplish their objectives with minimal input, allowing them to focus on the decision-making process rather than struggling with the interface. In the context of DSS, efficiency ensures that decision-makers can access relevant data and tools quickly, supporting timely and informed decisions. Improving system efficiency often involves streamlining workflows and optimizing feature accessibility. Memorability, or the ability to remember how to use the system after a period of non-use, is another critical usability factor. This aspect depends heavily on consistent menu layouts and intuitive design, which help users recall how to navigate and operate the system even after a period of inactivity. Systems with high memorability reduce the need for repeated learning and increase user confidence during subsequent interactions. For decision-makers who may not use the system daily, strong memorability ensures continued effectiveness and familiarity. Enhancing this component typically involves simplifying navigation and maintaining a logical structure across all interfaces.

The error prevention and recovery capability of a system is also a vital usability component. It reflects how well the system detects and assists users in resolving errors, as well as the frequency of errors that occur during interaction. A system that minimizes errors and provides clear feedback when mistakes happen contributes to a smoother user experience. Additionally, it should enable users to recover from errors easily, thereby reducing frustration and enhancing overall trust in the system. In decision support systems, where incorrect inputs or misinterpretations can have significant consequences, robust error handling is essential for maintaining accuracy and reliability. Lastly, user satisfaction plays a central role in determining the overall usability of a system. Satisfaction refers to the extent to which users feel comfortable and maintain a positive attitude toward using the product or system. High user satisfaction indicates that the system meets or exceeds expectations in terms of design, performance, and ease of use. Satisfied users are more likely to engage with the system consistently and recommend it to others, contributing to long-term adoption. Measuring satisfaction typically involves surveys and interviews that capture subjective experiences and emotional responses to system interactions. Ultimately, ensuring high levels of user satisfaction supports both usability and the successful implementation of decision support systems in real-world environments.

Table 2 presents a list of measuring questions for assessing the level of convenience and satisfaction with decision-making in understanding, learning, and interacting with DSS or a website. Every question is assigned an average value by the decision maker, with a range scale marked from 1 to 5. The values tallied in this table indicate that the taker found it very easy or very satisfying in various aspects related to using DSS or their website. With an average value above 4.4 for each question, it can be concluded that the taker's overall decision indicates a high level of satisfaction and comfort in learning, interacting, and understanding their DSS or website use, even without written instructions.

Table 2. Question about Ease of Use

A	*Convenience (learnability)*	*Mark*
1	The decision maker learns to use the DSS easily.	4.45
2	The decision maker easily obtains specific information.	4.43
3	The decision maker understands the presented information easily.	4.44
4	The decision maker can navigate channels with ease.	4.45
5	The decision maker can learn how to use the website without written instructions.	4.54

Table 3 contains a list of questions that focus on the ability to make decisions, remember, and understand how to use the DSS, as well as direction navigation in different time periods. Question number 6 shows that the taker found it very easy to remember how to use DSS, with an average value of 4.45. Question number 7 also demonstrates convenience in remembering direction navigation, with a mean value of 4.44, indicating that participants feel comfortable exploring DSS features and content. However, regarding question number 8, the average value of 4.32 indicates that although the user finds decision-making easy enough to remember the way of using the DSS, they may encounter some difficulty when returning to use this application after a period of time (more than 1 month). This may indicate the need to update or repair the design interface so that users can easily remember and use the application even after a longer period.

Table 3. List of Questions about The Convenience of Remembering

B	Convenience in Remember	Mark
6	The decision maker easily remembers how to use the DSS.	4.45
7	The decision maker easily remembers all navigation instructions for exploring features and content.	4.44
8	The decision maker remembers how to use the DSS if they use the application again after more than one month.	4.32

Table 4 presents several evaluation questions regarding the speed, accessibility, and efficiency of decision-making when using a system or application. Question number 9 indicates that the taker feels very capable of accessing the feature in the application, with an average value of 4.45. This indicates that users perceive the application as effective and respond to it to access various features quickly. Question number 10 also shows that the taker's decision feels like you can quickly obtain their information search in the application, with an average value of 4.42. This indicates that the application has its own efficient and responsive search capabilities. However, regarding question number 11, with a mean value of 4.32, it is evident that participants may require a few more seconds to complete the task when testing this application. This can be caused by various factors, such as complex tasks or user interfaces that may need an upgrade. Therefore, these results can serve as a guide for improvement and development in the application to enhance efficiency in task testing.

Table 4. List of Questions about DSS Efficiency

C	*Efficiency (efficiency)*	Mark
9	The decision maker can access this feature quickly.	4.45
10	The decision maker can quickly find the information they are searching for.	4.42
11	The decision maker can complete the testing task quickly.	4.32

Table 5 includes several ability-focused questions that help the decision maker avoid errors, find the desired menu, and repair errors that may occur when using the DSS. Question number 12 indicates that the decision maker seldom finds an error when using DSS, with an average value of 4.4. This shows that application or their DSS use tend to be free from error and provide relative experience without interference. Question number 13 shows that the decision maker feels fairly confident in finding the search menu in the application, with an average score of 4.39. This indicates that the interface and menu structure in the application are intuitive enough to facilitate efficient search. Question number 14 measures the ability to decide whether to repair an error if a mistake is made when using DSS. With a mean value of 4.38, these results indicate that decision-makers feel sufficiently capable in this area. This could indicate that DSS delivers a good guide or option to correct errors that may occur during application use. Overall, this table indicates that decision-makers feel comfortable in the event of rare errors occurring, can navigate the menu effectively, and are capable of repairing errors if required during the use of DSS.

Table 5. List of Error Prevention Questions

D	*Prevention Error (error)*	Mark
12	The decision maker encountered no errors while using the DSS.	4.4
13	The decision maker successfully found the menu they were looking for.	4.39
14	If the decision maker makes a mistake while using the DSS, they can correct it.	4.38

Table 6 illustrates the evaluation of decision-makers on various aspects of the design and interface of the DSS. Question number 15 indicates that decision-makers were generally satisfied with the appearance of the DSS design, with an average rating of 4.45. This indicates that the DSS design was well-received and provided a satisfying visual experience. Question number 16 reflects that decision-makers felt comfortable using the DSS, with an average value of 4.45, suggesting that the DSS interface facilitated comfortable interaction and efficient use. Question number 17 stated that the composition of colors and placement of content in the DSS were not confusing to decision-makers, with an average value of 4.45. This demonstrates that the DSS design successfully avoided confusion and maintained clarity. Question number 18 showed that the use of the DSS met the expectations of decision-makers in terms of functionality, with an average value of 4.45. This suggests that the DSS effectively fulfilled the needs and expectations of the users. In comparison to previous studies, the results of this evaluation align with findings in similar research on the usability of DSS. For example, studies by Mandiri Online and e-tourism systems have shown that interface clarity and ease of use are significant factors contributing to user satisfaction [5, 7]. In these studies, high user satisfaction was linked to intuitive interface designs and the seamless integration of functionality that met users' expectations, findings similar to those in this research. The high ratings for design satisfaction, comfort, and clarity in this study indicate that the DSS evaluated here meets or exceeds industry standards for user experience in decision support systems.

Table 6. List of Satisfaction Questions

E	*Satisfaction of Decision Maker (satisfaction)*	Mark
15	Decision makers generally feel satisfied with the design and appearance of the DSS.	4.45
16	They feel comfortable using the DSS.	4.45
17	The color composition and content layout are clear and unconfusing.	4.45
18	The use of the DSS meets the decision maker's expectations and needs.	4.45

Furthermore, the results indicate that the DSS performs exceptionally well in areas such as user satisfaction and interface usability when compared to other usability tests in the literature. In some previous studies, such as those focusing on mobile banking applications, usability scores were lower, reflecting issues including confusing navigation and difficulty accessing data [5]. The consistently high scores in this study (4.45) indicate that the DSS design and interface meet or exceed user expectations for comfort, clarity, and functionality, which is an important benchmark for future system designs. Overall, the results from this table suggest that decision-makers are highly satisfied with various aspects of the DSS design and interface. They feel comfortable using the system and are satisfied with its overall functionality, demonstrating the system's success in meeting user needs and expectations. Figure 6 summarizes all the criteria. It compares five evaluation criteria based on their scores, which range from 4.34 to 4.48. The criteria include "Convenience (learnability)," "Convenience in remembering," "Efficiency (efficiency)," "Prevention Error (error)," and "Satisfaction of Decision Maker (satisfaction)." The highest score is observed in "Satisfaction of Decision Maker (satisfaction)" and "Convenience (learnability)," both exceeding 4.46. "Efficiency (efficiency)" and "Convenience in remembering" follow with slightly lower scores, while "Prevention Error (error)" scores the lowest, just above 4.34. This suggests that the evaluated system or process is particularly strong in terms of user satisfaction and ease of learning, but has some room for improvement in error prevention.

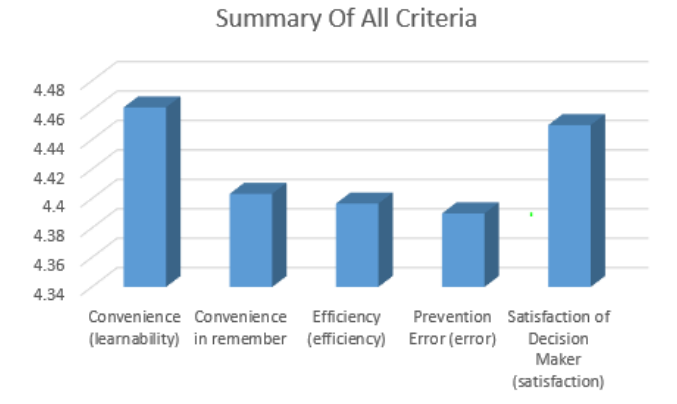

Figure 6. Summary of All Criteria

4. CONCLUSION

The conclusions of this research clearly address the objectives by highlighting the novelty of the proposed approach to enhancing the usability of DSS. Unlike prior studies focused primarily on interface adjustments, this research emphasizes a comprehensive evaluation procedure that integrates user-centered design elements with real-time decision-making needs. This approach enhances both the functionality and the practical application of DSS for decision-makers, ensuring the system is not only user-friendly but also effectively supports complex decision-making processes. The findings indicate that addressing navigation complexity, improving data accessibility, and prioritizing user-critical features such as data visualization and real-time functionalities significantly enhance the usability of DSS. From a practical perspective, this study provides several actionable insights for decision-makers and system developers. For decision-makers, the research highlights the importance of having an intuitive, easy-to-navigate interface that minimizes cognitive load, allowing them to make decisions more efficiently. It also emphasizes the need for DSS to incorporate real-time data and relevant visualizations, which can improve decision quality and reduce the time spent analyzing data. For system developers, the research provides clear guidelines on the areas that require attention, such as simplifying navigation and improving the accessibility of key information. Developers can focus on refining user interfaces, enhancing real-time functionalities, and ensuring that data visualization tools are tailored to the specific needs of decision-makers. These improvements not only enhance the usability of DSS but also contribute to better decision outcomes and more informed decision-making in various organizational contexts. Ultimately, this research offers valuable insights into designing DSS that are not only user-centric but also capable of meeting the practical demands of dynamic and complex decision-making environments.

Future studies should explore the integration of adaptive interface technologies, such as AI-driven customization, to better align DSS functionality with individual user needs and real-time decision requirements. These adaptive systems could dynamically adjust the interface based on user preferences and the context of decision-making, improving overall user satisfaction and decision-making efficiency. Additionally, a longitudinal study on DSS usability could provide insights into how user interactions and preferences evolve over time, informing further refinements in system design and usability. This type of study would enable researchers to evaluate how the system's effectiveness and usability evolve as users gain more experience and interact with the system over extended periods, thereby providing a deeper understanding of long-term usability trends. Future research should also address some limitations encountered in this study. One key area for exploration is the impact of different types of decision-making tasks (e.g., simple vs. complex decisions) on the usability of DSS. Investigating how DSS performs in diverse decision-making contexts could lead to more tailored system designs that better support various types of decisions. Moreover, future studies could consider a broader range of user demographics and industries to evaluate how DSS usability varies across different sectors and user groups. By exploring these areas, future research can drive continuous improvement in DSS design, ensuring systems remain relevant and effective in supporting dynamic decision-making processes.

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6. DECLARATIONS

AUTHOR CONTIBUTION

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