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Heuristic Evaluation of UI/UX to Enhance Experience and Sales in E-commerce

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Abstract

User experience and interface (UI/UX) are critical elements in e-commerce websites, where an unattractive design and lack of user engagement can negatively impact potential sales. This study was conducted to evaluate the effectiveness of the UI/UX on a company's e-commerce website, which has received complaints from users regarding the interface design and low purchase interest. The evaluation was conducted using the Heuristic Evaluation method, applying Nielsen's 10 principles with three evaluators to identify interface issues affecting user experience. The results of the study revealed significant weaknesses in three main principles: "Visibility of System Status," "Match Between System and the Real World," and "Help and Documentation." Each of these principles received a score of category 2 on the Likert Scale, indicating substantial usability weaknesses in the UI. Solutions implemented included improving icon visibility, providing clearer system feedback, using more understandable language, and adding comprehensive online guidance. After these improvements, a re-evaluation showed score increases: "Visibility of System Status" improved from 38.4% to 49.6%, "Match Between System and the Real World" from 38.4% to 51.2%, and "Help and Documentation" from 37.6% to 48.8%. These findings indicate that UI/UX improvements based on Heuristic Evaluation can enhance the overall user experience, which is expected to help the company attract potential buyers and increase sales potential through the e-commerce website.

I. INTRODUCTION

The 2023 Association of Indonesian Internet Service Providers (APJII) study shows that internet penetration in Indonesia has reached 215.62 million users, or 78.19% of the total population, presenting a great opportunity for businesses to leverage digital platforms, especially e-commerce [1]. E-commerce in Indonesia is experiencing rapid growth, driven by an increasing user base that reached 58.63 million in 2023 and is projected to grow further to 99.1 million by 2029. With transaction values expected to exceed USD 62 billion by 2025, e-commerce has the potential to become one of the main sectors in Indonesia's digital economy [2]. However, to compete in this competitive industry, e-commerce websites must offer not only products but also an exceptional User Experience (UX). Similar issues are observed on the e-commerce website www.marvelcoolers.com, which faces challenges related to poor design and user experience.

User Interface (UI) design and User Experience (UX) significantly influence user interaction and encourage sales conversion on e-commerce websites [3]. Effective and attractive UI/UX can create easy interactions and foster user loyalty, ultimately increasing their likelihood of completing a transaction. In contrast, a difficult-to-navigate and unappealing design can frustrate users, leading them to leave the site without making a purchase [4]. A study by Fauzi (2019) revealed that 67% of internet users are more likely to transact on a user-friendly site, while 61% will leave a site they find user-unfriendly [5]. Therefore, a UI/UX evaluation is essential, especially for the e-commerce website www.marvelcoolers.com, to ensure ease of use and comfort that directly impact sales conversion.

This study aims to identify the strengths and weaknesses of the UI and UX on an e-commerce website using the Heuristic Evaluation method. This analysis is expected to identify areas for improvement to achieve optimal

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user effectiveness, efficiency, and satisfaction, ultimately supporting the growth of sales potential and conversion on the website [6].

The Heuristic Evaluation method, developed by Jakob Nielsen and Rolf Molich, is used in this study to identify usability issues in the user interface. This method is proven effective in the e-commerce context, as it highlights aspects such as learnability, efficiency of use, and user satisfaction, which are crucial for the online shopping experience [7]. By involving three expert evaluators, this method enables a more in-depth evaluation of UI/UX elements, allowing for the identification of design issues that might not be immediately apparent to regular users [8]. Additionally, a large number of respondents is not required in this method, reducing the risk of testing failure. With fewer respondents needed, the research can be conducted more efficiently and effectively, saving time and resources [9].

The e-commerce website analyzed in this study provides features that allow users to view the company profile, display products, and conduct online transactions. However, the website continues to receive user complaints, particularly regarding navigation difficulties and low readability. Therefore, this study will produce concrete recommendations to improve UI/UX quality, thus enhancing user comfort while also creating opportunities for increased conversion rates and customer loyalty [10].

With an evaluation using the Heuristic Evaluation method, this study is expected to make a meaningful contribution to enhancing UI/UX in Indonesia's e-commerce sector. The results of this evaluation are anticipated to serve as a valuable resource for further development and as a strategic reference for companies in creating a better shopping experience, ultimately driving sustainable sales growth.

II. Related Works/Literature Review

The study conducted by Farouqi (2018), titled "Usability Evaluation of the Go-Jek Application Using the Usability Testing Method," aimed to explore the issues encountered by users of the GO-JEK application. The results of this study identified four main focus areas: ease of use, efficiency, error rate, and user satisfaction. In terms of ease of use, GO-JEK users in Indonesia achieved a 100% success rate in completing assigned tasks. Efficiency showed good results, with an average speed of 0.01 tasks per second and a total information search time of 538 seconds. The error rate was also low, at 0.1 or 3 errors out of 30 trials, which is within an acceptable range. For satisfaction, users scored 60-70% (grade B), indicating that the GO-JEK app is generally satisfying for users. However, some minor issues were detected, such as unclear requirements to contact the driver first and a rating page display that affected user comfort [11].

Sriyeni (2022), in her study titled "Usability Analysis of Digital Investment Applications Using the Heuristic Evaluation Method and System Usability Scale," examined the Bibit application using the Heuristic Evaluation and System Usability Scale (SUS) methods. Heuristic Evaluation was used to assess the application's functionality with Nielsen's indicators, while SUS measured usability from the end user's perspective. The results indicated that the Bibit application did not experience significant functional issues, with an average severity level score of 1.4 (rounded to a scale of 1), suggesting that major improvements were unnecessary. However, this study was limited by a sample randomly drawn from Bibit's official group, which may not fully reflect the overall user experience [12].

Umam (2021), in his study titled "Comparative Analysis of Three Usability Evaluation Methods in Identifying Usability Issues (Case Study: Situbondo Tera Application)," used three different methods: (a) Usability Testing, (b) Cognitive Walkthrough, and (c) Heuristic Evaluation. The study aimed to identify usability issues and compare the effectiveness of the three methods. A total of 10 respondents participated in Usability Testing and Cognitive Walkthrough, while three expert evaluators were involved in the Heuristic Evaluation. The results identified 41 usability issues, with 18 issues found by the Heuristic Evaluation, 12 issues by the Cognitive Walkthrough, and 11 issues by Usability Testing [13].

These three studies demonstrate variation in the effectiveness of each method. Usability Testing focuses on direct user experience with specific tasks, yielding valuable data on the effectiveness and efficiency of user interaction. The System Usability Scale (SUS) provides an overall user satisfaction rating in a quantitative score, but it is less detailed in identifying specific interface issues [14]. Meanwhile, Cognitive Walkthrough is effective in assessing ease of learning by placing evaluators in the perspective of new users but has limitations in detecting issues in broader functional aspects.

In the context of UI/UX evaluation for e-commerce websites, the Heuristic Evaluation method was selected for this study due to its advantages in quickly identifying design and usability issues from an expert perspective without requiring a large number of respondents [15]. This method offers several advantages over others, such as Usability Testing and Cognitive Walkthrough. First, Heuristic Evaluation is highly efficient in identifying usability issues at an early stage, which helps reduce design correction costs later on. Second, it allows a comprehensive evaluation of visual and functional aspects, such as navigation and readability, which are highly relevant in the e-commerce industry, where a smooth user experience can increase conversion and customer loyalty. Third, the flexibility of this method enables evaluators to explore the interface more freely without being

bound to specific scenarios, increasing the likelihood of detecting usability issues that may not be visible with other methods [16].

III. METHODS

The research method used in this study is the Heuristic Evaluation method, developed by Jakob Nielsen and Rolf Molich. This method is used to identify usability issues in the user interface (UI) and is designed to yield accurate findings in testing the website under study [17]. This research involves a series of systematically designed stages to ensure an in-depth evaluation and focused improvement recommendations, including the following:

1) Evaluation Plan Development
In the initial stage, an evaluation framework is developed, including time planning and identifying the stakeholders involved in the evaluation. The selected evaluation team consists of two individuals with backgrounds as graphic designers who have contributed to web and product development for three years, as well as one evaluator with a background in web development and testing for one year. The selection of these evaluators is based on their expertise and relevant experience in interface design and testing.
2) Alignment with the Website
In this stage, an in-depth understanding of the website's structure, navigation, and key features is established, allowing the evaluators to recognize the website's context and the user interactions that occur within it.
3) Design of the Heuristic Questionnaire
The questionnaire is designed based on Nielsen's ten principles of Heuristic Evaluation. Each principle contains 3 to 5 questions relevant to the Heuristic Evaluation principles applied in testing the website. The questionnaire uses a Likert scale to collect responses that are easy for the evaluators to understand and provide quantitative data that can be easily processed. A sample of questions given to the evaluators is provided in Table 1.

TABLE 1
SAMPLE QUESTIONS FOR HEURISTIC QUESTIONNAIRE

No.	Question	Responses(a score between 1-5 on a Likert scale)
1.1	Does each page have a title that clearly describes its content?	-
1.2	Are the icons and design on each page consistent?	-
1.3	Do instructions, help, and error messages appear at the right time and place?	-
1.4	After the user completes one or more actions, is there feedback explaining the next step?	-
1.5	Is each provided button easy to understand in terms of its function and does it work properly when used?	-

4) Testing by Evaluators
The testing stage involves three designated evaluators in conducting the UI and UX evaluation. To maintain consistency in assessment, a brief discussion and explanation with the evaluators are held prior to testing to ensure a shared understanding of the evaluation criteria. In this first phase of testing, all principles of the Heuristic Evaluation are assessed by the evaluators. Each aspect is rated using a Likert scale with five levels, allowing evaluators to determine how well the UI elements adhere to the Heuristic Evaluation principles [18], as shown in Table 2.

TABLE 2
LIKERT SCALE

Scale	Percentage	Weight of the Score
Strongly Agree	80% - 100%	5
Agree	60% – 79.99%	4
Neutral	40% - 59.99%	3
Disagree	20% – 39.99%	2
Strongly Disagree	0% - 19.99%	1

5) Data Collection
After testing, each evaluator's assessment results are recorded to identify the main issues found. The Likert scale used enables evaluators to provide accurate responses, reducing the potential for subjective assessments. A sample of responses is shown in Table 3.

TABLE 3
SAMPLE ANSWER FOR HEURISTIC QUESTIONNAIRE

No.	Question	Responses (a score between 1-5 on a Likert scale)
1.1	Does each page have a title that clearly describes its content?	3
1.2	Are the icons and design on each page consistent?	2
1.3	Do instructions, help, and error messages appear at the right time and place?	3
1.4	After the user completes one or more actions, is there feedback explaining the next step?	4
1.5	Is each provided button easy to understand in terms of its function and does it work properly when used?	2

6) Problem Prioritization
The issues identified are prioritized based on the lowest scores obtained from the testing results [19]. The score calculation method is conducted using the following formula:

$$Score = T \times Pn \quad (1)$$

Explanation:
T: The total number of respondents who selected a specific value on the Likert scale.
Pn: The value on the Likert scale (1 for "Strongly Disagree" to 5 for "Strongly Agree").

Example calculation:
Strongly Agree: $2 \times 5 = 10$
Agree: $1 \times 4 = 4$
Neutral: $0 \times 3 = 0$
Disagree: $0 \times 2 = 0$
Strongly Disagree: $0 \times 1 = 0$

Total Score = 14

To determine the percentage index, the following formula is used:

$$Percentage\ Index = \frac{Total\ Score}{Y} \times 100 \quad (2)$$

Explanation:
Y: The highest possible score on the Likert scale (5) multiplied by the number of respondents.

For Example, if there are 3 respondents:
Highest score: $Y = 5 \times 3 = 15$
Total score from the example above is 14

Calculating the percentage index:

$$Percentage\ Index = \frac{14}{15} \times 100 = 93.33\%$$

Score interpretation is based on the following percentage intervals:
0% – 19.99% = Strongly Disagree
20% – 39.99% = Disagree
40% – 59.99% = Neutral
60% – 79.99% = Agree
80% – 100% = Strongly Agree
Data from the Likert scale is then processed, and the results are obtained. The three Heuristic Evaluation categories with the lowest scores are set as priorities for improvement.

7) Report Preparation
An initial report is prepared, covering a description of the methodology, evaluation results, identified issues, improvement recommendations, and steps for further development.

8) Prototype Design
Based on the findings from the initial stage, a design for improvements is created using the Figma application. This prototype is designed to enhance usability and user experience based on the improvement recommendations provided by the evaluators.

9) Second-Stage Testing by Evaluators
In the second stage, the evaluators conduct another evaluation of the revised prototype. This evaluation uses the same Heuristic Evaluation principles as the first stage. Before testing, the evaluators are shown the prototype design along with the implemented improvements to maintain consistency and ensure that the evaluation remains objective and free from subjective biases.

10) Second-Stage Data Collection
The results of the prototype testing are recorded to identify any additional issues that may arise and to assess how well the improvements have been implemented.
11) Final Report Preparation
The final report is prepared, covering the methodology, evaluation results, issues found in the prototype, and final recommendations. The report also includes a comparative analysis between the initial evaluation and the prototype to provide a comprehensive conclusion regarding the improvements achieved.

IV. RESULTS

The research results were obtained through the analysis of questionnaire data collected from three evaluators based on the Heuristic Evaluation criteria standards. The data covers ten categories: "(1) Visibility of System Status, (2) Match Between System and the Real World, (3) User Control and Freedom, (4) Consistency and Standards, (5) Error Prevention, (6) Recognition Rather Than Recall, (7) Flexibility and Efficiency, (8) Aesthetic and Minimalist Design, (9) Help Users Recognize, Diagnose, and Recover from Errors, and (10) Help and Documentation [20]." The following is a recap of the measurements taken for the website under study, with each category containing the Heuristic Questionnaire, as shown in Table 4.

TABLE 4
RECAPITULATION OF HEURISTIC QUESTIONNAIRE RESULTS

No.	Category	Percentage	Information
1	Category 1	38.4%	Disagree
2	Category 2	38.4%	Disagree
3	Category 3	40.8%	Neutral
4	Category 4	47.5%	Neutral
5	Category 5	40%	Neutral
6	Category 6	66.66%	Agree
7	Category 7	52.5%	Neutral
8	Category 8	59.99%	Neutral
9	Category 9	48.75%	Neutral
10	Category 10	37.6%	Disagree

In the initial evaluation, several categories showed the lowest percentage scores, indicating that these categories require improvements. In this study, the improvements will focus on three categories: "Visibility of System Status," "Match Between System and the Real World," and "Help and Documentation." In the "Visibility of System Status" category, evaluators assessed that the status information was hard to read and the use of icons/symbols was inappropriate. In the "Match Between System and the Real World" category, evaluators found that the system's terminology did not align with the common understanding of users. Meanwhile, in the "Help and Documentation" category, there was a lack of sufficient online guides, and the additional explanations were inadequate.

Based on the initial evaluation results, the following improvement recommendations were made:

1) Visibility of System Status
Add visual feedback on system status and clarify icons/symbols to make them more recognizable.
2) Match Between System and the Real World
Use more familiar terminology and reduce technical jargon.
3) Help and Documentation
Provide online guides and enrich the information in the help menu.

After the prototype improvements were implemented, the three evaluators conducted further testing on the three categories that had received the lowest scores. Below is a comparison of the average scores from the initial evaluation and after improvements for these three categories, as shown in Table 5.

TABLE 5
COMPARISON OF INITIAL AND POST-REPAIR EVALUATION RESULTS

Category	Average Score (Initial Evaluation)	Average Score (After Improvement)	Increase (%)
Visibility of system status	38.4%	49.6%	29.17%
Match between system and the real world	38.4%	51.2%	33.33%
Help and Documentation	37.6%	48.8%	29.79%

The table shows an increase across all categories. The average score for "Visibility of System Status" rose from 38.4% to 49.6%, an increase of 29.17%. The "Match Between System and the Real World" category

improved from 38.4% to 51.2%, marking a 33.33% increase. Meanwhile, the "Help and Documentation" category increased from 37.6% to 48.8%, a 29.79% improvement.

To further illustrate these improvements, a comparison chart before and after improvements is presented in Figures 1, 2, and 3.

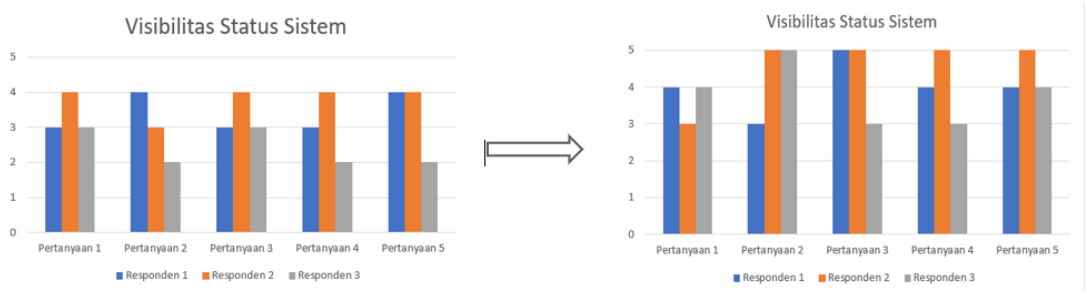

Fig. 1 Comparison chart in the category "Visibility of System Status"

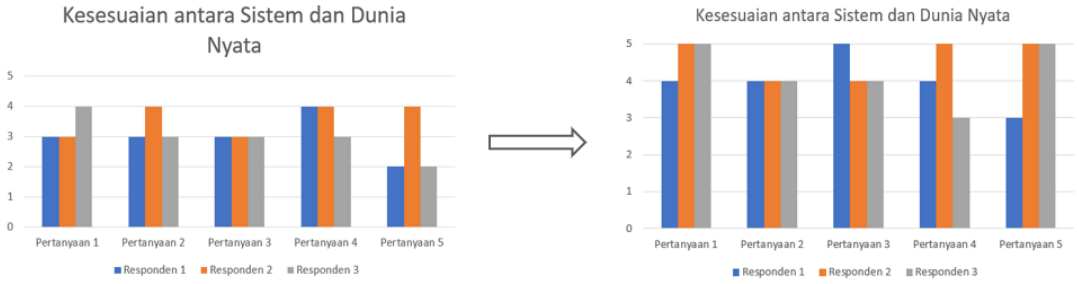

Fig. 2 Comparison chart in the category "Match Between System and the Real World"

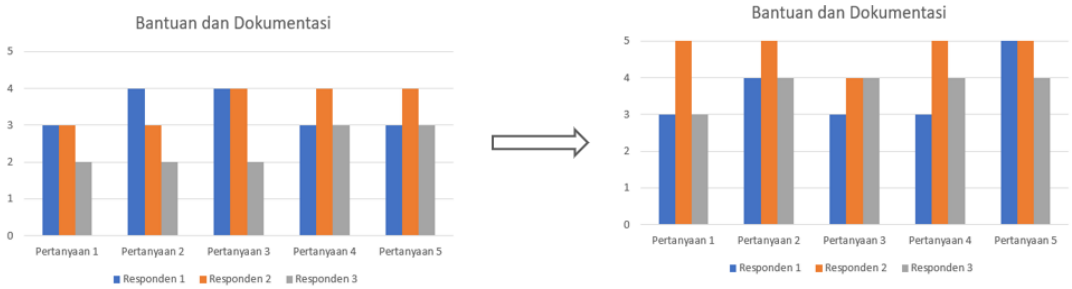

Fig. 3 Comparison chart in the category "Help and Documentation"

Although Heuristic Evaluation is effective in detecting UI/UX issues, this method has its limitations. Heuristic Evaluation relies on the perspectives of evaluators, which means the evaluation may not fully reflect the direct experience of users. Compared to Usability Testing, where actual users interact with the interface, Heuristic Evaluation may overlook issues that arise in real e-commerce scenarios, such as difficulties in completing transactions or using specific features. In contrast to research by Farouqi (2018), which used Usability Testing on the GO-JEK app, the Heuristic Evaluation in this study proved effective in identifying main design and functionality issues. However, Farouqi's study provided more detailed results on user efficiency aspects. This study also differs from Sriyeni's (2022) research on the Bibit app, which combined Heuristic Evaluation with the System Usability Scale (SUS), enabling the integration of data directly from the user's perspective.

V. DISCUSSION

This study, using the Heuristic Evaluation method, successfully identified usability issues on the examined website. It revealed three main issues: "Visibility of System Status", "Match Between System and the Real World", and "Help and documentation." Following improvements based on these findings, the prototype design achieved notable percentage increases in Likert scale scores. The "Visibility of System Status" category rose from 38.4% to 49.6%, "Match Between System and the Real World" from 38.4% to 51.2%, and "Help and Documentation" from 37.6% to 48.8%. These findings demonstrate that Heuristic Evaluation can effectively uncover usability issues. Supported by improvements to the prototype design informed by Heuristic Evaluation, this research achieved enhancements in the website's UI/UX quality. The study aligns with previous research also

using Heuristic Evaluation to assess website or application usability. For instance, Umam's (2021) study showed that Heuristic Evaluation surfaced a higher percentage of issues compared to Usability Testing and Cognitive Walkthrough. A key strength of this research lies in its use of a real corporate website, providing external validity. Additionally, Heuristic Evaluation allowed for quick and accurate identification of usability issues. However, there are limitations to consider. Heuristic Evaluation relies heavily on the evaluators' understanding of heuristic principles, and variations in evaluator expertise may impact consistency, making findings harder to generalize across different contexts. This method also depends on evaluators' subjective analysis without direct user involvement, potentially not fully reflecting the comprehensive user experience. The findings of this study hold practical implications for the e-commerce sector, especially in enhancing user satisfaction and loyalty. By addressing key identified issues, companies can improve website quality, for instance, by adjusting layout, enhancing visibility, and adding new features, which are expected to bolster the company's online presence and ultimately drive increased sales.

VI. CONCLUSIONS

Thus, this study successfully identified three main issues on the website. Improvements in these areas are expected to enhance user experience by providing clearer feedback, using more familiar language, and offering navigational support features. These UI/UX improvements are not only expected to create a more efficient shopping experience for users but also have the potential to increase conversion rates by making the transaction process easier to understand and access. The limitation of this study lies in its dependence on the evaluators' competence in applying the Heuristic Evaluation method. Therefore, future research is recommended to use or combine Heuristic Evaluation with other methods, such as Usability Testing, which involves direct user participation and focuses on issues experienced by users. This approach aims to increase satisfaction in UI/UX aspects more comprehensively. These findings provide important implications for the e-commerce sector in improving UI/UX quality to foster user satisfaction and loyalty, as well as enhance competitiveness in a crowded market.

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