



Evaluating Usability Techniques in Modern Web Applications

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Abstract: Globally, the use of web-based applications is expanding quickly. Users' requirements for accessibility and engagement have consequently evolved dramatically. Conventional webpages are no longer sufficient. Users have a new experience with modern web applications. Nowadays, developers and the industry place a high value on usability. Every day, more people utilize web apps, and they favor user-friendly and comprehensible platforms. Nonetheless, many programs remain to have usability problems. This paper also examines the advantages and disadvantages of usability evaluation techniques. Currently, IT is becoming an integral part of daily life, with people seeking fast and simple solutions. In response to user needs, various usability techniques have been created. Several factors influence user experience with these techniques. This study aims to examine user behaviour and usability methods using a straightforward survey cross-sectional method, including a sample of users interacting with web applications.

Keywords- usability, web applications, user experience, evaluation, testing.

INTRODUCTION

Currently, web application development is undergoing growth at two speeds; users' experience with the systems is being influenced due to increased digitalization in their day-to-day lives. As per the recent research done by the experts on user experience and usability design in digital applications, customers prefer web applications that are intuitive and easy to operate since most transactions are performed using digital media [1].

One such fundamental concept that can influence ease of use by users in using the web application is the concept of usability. Sometimes, it may be challenging for users to use the complex nature of the new generation of web applications. Consequently, various methods have been introduced to identify problems and enhance user experience. The use of usability evaluation methods in light of current studies on human-computer interactions includes surveys, user testing, and heuristic evaluation [2].

The methods used for achieving usability are more advanced in developed countries than in developing countries. Nonetheless, there is a myriad of challenges that hinder proper implementation, especially in the implementation of usability testing methodologies [3]. With increasing technology, users expect better performance and design of web applications. Unfavorable usability may sometimes lead to confusion and mistakes, making users unhappy with everyday operations.

Several firms apply usability techniques in the development stage with the intention of improving the experience for the user. Based on user evaluation research conducted in sophisticated systems recently, this helps them understand user behavior and improve system design [4]. On the other hand, limitations like a lack of awareness, limited resources, and poor testing methods affect usability evaluation.

Main objective of this research:

1. for researching the topic of usability in modern-day web applications.
2. for analyzing several approaches to usability evaluation, such as surveys, usability testing, and heuristic evaluation.
3. for identifying the most common usability issues faced by users while interacting with online applications.
4. for examining the impact of usability on the overall enjoyment of users.
5. for assessing different usability approaches and comparing their effectiveness.
6. for suggesting ways of improving the usability of modern-day online applications.

LITERATURE REVIEW

This research utilized quantitative data obtained from usability tests and surveys. User-based assessments concentrated on specific individuals, in addition to traditional methods. The results showed that the ease of use, interface design, and



navigation of online applications had a big effect on how useful they were. Usability engineering principles also show that adding more features doesn't make users happier [5].

This study also looks at what users like and how they respond when they use a web app, which has a big effect on how they feel about it. The research utilizes data gathered from online applications submitted by active users of websites and apps. The results show that following usability principles makes the system work better and makes users happier. The study also found that a complicated design doesn't affect performance, but easy navigation helps users finish tasks. The results are compatible with guidelines regarding the design of a user experience framework [6].

The present research was particularly interested in the issue of usability assessment among different users. Many researchers view this as a controversial issue. With the demands of customers for quick and efficient interfaces, it is imperative to understand what influences the ease-of-use of web applications. The results not only hold practical implications for the developers but also contribute to the academic discourse regarding how to boost system performance and usability. Furthermore, the suggestions provided by the authors refine the methodologies employed to increase usability and, particularly, user experience. The outcome may be user experience or system performance [7].

The study tested usability using a variety of methods, including heuristic analysis and user testing. This study demonstrates that customer behavior differs according on expert level, emphasizing that some consumers value utility while some are more influenced by design clarity. However, most respondents agreed that continuing the use of web-based apps depends on usability, which is further supported by usability testing research [8]. These results show how important designer-developer communication is to improving design techniques.

While the study improves theoretical and practical knowledge, it has multiple limitations that should be taken into account in further investigations. The present study only employed a limited number of usability evaluation techniques. More rigorous analysis of such components can prove useful for future research, possibly focusing on advanced usability methods and live testing. Lack of sufficient information and user bias can introduce further restrictions, particularly when dealing with user input or system performance, as seen in the interaction design literature [9].

The findings contribute to the existing pool of knowledge and have various implications for web developers since they offer valuable information that can be used to boost the usability of modern-day websites. The findings assist in the formulation of approaches that help design friendly interfaces and optimize the functioning of systems altogether. In addition, the suggestions by the researchers help develop usability tools, especially those that focus on accessibility and interaction design [10].

Several usability testing techniques, such as heuristic analysis, cognitive walkthrough, and various user testing approaches, have been employed for the purpose of this research. In fact, from the results obtained herein, it is clear that the behavior of users differs in accordance with their degree of expertise, whereby novice users are affected to a greater extent by issues related to simplicity while experts focus more on functionalities [11].

It is vital to enhance the usability standards and encourage teamwork between designers and engineers for the effective development of the system. It should be noted that some research papers demonstrate that usability plays a significant role in retaining users and engaging them in interaction with the website. In addition, proper usability assessment helps decrease mistakes and increase system effectiveness [12].

Despite the contributions made in this paper, both theoretically and practically, there is room for improvement in a number of areas. For example, the study involved only a limited number of participants as well as only some of the usability techniques. Future research might overcome these deficiencies by using advanced methodologies and a usability testing environment [13].

METHODOLOGY

This study uses qualitative, experimental, and framework-based methodologies to examine usability evaluation methods used in current online applications. Instead of gathering direct data from users, the study makes use of secondary sources, such as scholarly articles, HCI standards, and accepted usability rating techniques.

This study's goal is to fully define and classify popular usability assessment techniques and to comprehend how they could be used in a variety of usability situations, such as graphical design, navigation structure, accessibility, and experience analysis.

Research Design:

The paper examines and classifies current usability evaluation techniques into useful groups utilizing a descriptive method. Understanding how various approaches affect the assessment of web-based application that usability is the main



goal.

Data Collection Method:

No original data collected from consumers is used in this work. Instead, it uses secondary data from professional publications, publications on usability and user interfaces, and scientific journals. WCAG guidelines and Nielsen's usability recommendations are examples of well-known structures that are used as additional information sources. This guarantees that the research is grounded in generally acknowledged usability rules.

Usability Evaluation Framework:

In this research, two main types of usability testing approaches have been found out:

- Inspection-based methods (user-free, expert-driven assessment)
- Experimental methods (behavior analysis and interaction-based user tests)
- Inspection-based methods (user-free, expert-driven assessment)
- Empirical methods (behavior analysis and user-based evaluations through interaction)
- Inspection-based methods (user-free, expert-driven assessment)
- Empirical methods (behavior analysis and user-based evaluations through interaction)

These strategies are further analyzed according to their focal points and relevance in diverse accessibility contexts.

Table 1: Usability Evaluation Techniques and Their Applications

Type	Technique Cluster	Focus	When to Use
Inspection	Heuristic Evaluation	Principles of UI	To find issues with the interface
Inspection	Walkthrough & Accessibility	Learnability, WCAG	For early design stages
Experimental	User Testing (Moderated & Unmoderated Tests)	Task completion, user	Small and large tests
Experimental	Behavioural Analysis (Heatmaps & Video Replay)	Interaction	To detect issues with usability

Data Analysis Approach:

The usability approach is evaluated based on its objective, area of application, and effectiveness in comparison to a description of the literature.

In order to show how different usability assessment approaches contribute to web application development and improve the user experience, the research compares inspection-based and empirical approaches to usability assessment [12], [13].

Advantages

The results are correct and trustworthy because the method is based on reliable sources from both business and academic settings. Furthermore, the implementation of the method is simplified by the elimination of data collection requirements. The technique makes it easier to compare different usability programs, which helps us keep a high level of theory.



Disadvantages

There are a number of problems that come up because this method hasn't been tested in real life. The quality of the existing literature, which varies a lot, is an important part of the findings. Also, because it can't see how real users act, there is no room for critical implementation.

RESULTS

It is evident from the analysis that both the empirical methods and the inspection methods are significant in improving the usability of web-based applications. Although empirical usability testing provides insights based on users' performance, the inspection methods help to recognize the flaws early on in the design process.

In Figure 1 below is the conceptual framework of the usability evaluation technique.

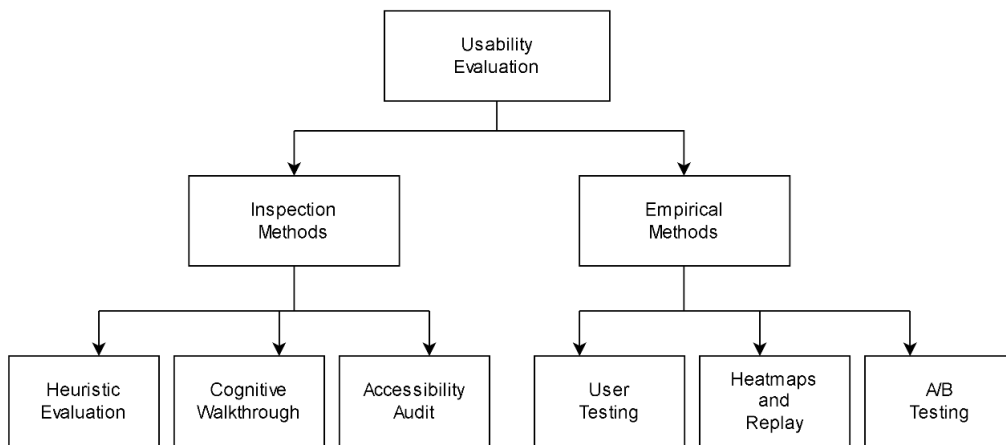


Fig. 1: Conceptual Framework of Usability Evaluation Techniques

From the analysis, it is evident that whereas the inspection techniques are faster and cheaper, the empirical technique is usually more effective in practical evaluation. A comparative evaluation of usability methods based on the effectiveness and ease of use of these methods is depicted in Figure 2 through a literature review-based study.

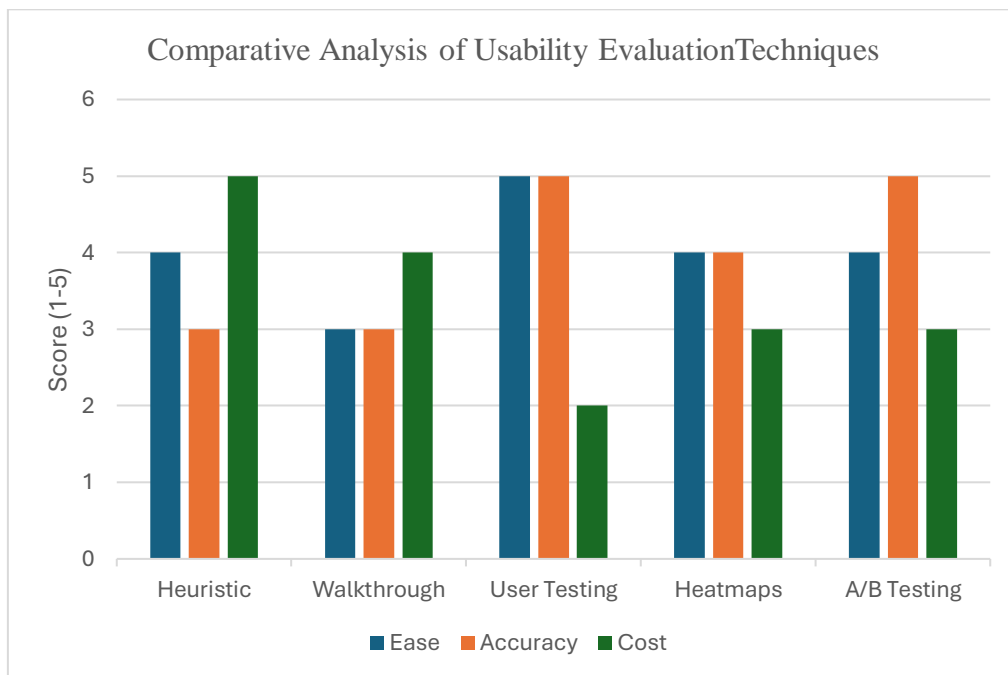


Fig. 2: Comparative Analysis of Usability Evaluation Techniques based on Ease of Use, Accuracy, and Cost Efficiency



CONCLUSION

In this study, the methodology of literature analysis was adopted in order to assess the usability evaluation techniques of modern web applications. The findings of this study show that empirical as well as inspection techniques play an important role in identifying problems associated with usability and improving user satisfaction [10, 11].

Although empirical techniques provide a deeper understanding of user behavior, inspection techniques can be useful in the design process [12]. Modern standards related to efficiency, effectiveness, or user enjoyment can act as a benchmark for usability evaluation [14, 15].

The findings indicate that utilizing multiple usability evaluation techniques is beneficial. Web application performance and quality can be improved by continuous assessment [13].

RESULT AND FUTURE DISCUSSION

It is clear from the findings that the usability evaluation approach significantly improves the quality of the web application. While empirical methods provide more in-depth knowledge about user behavior, the inspection method serves as a useful tool in diagnosing problems at an early stage. As per the study, a successful usability evaluation process emerges when both the approaches are used together. Future studies may consider integrating both approaches.

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