

Usability Analysis of The Gudang Madu Sumatra Website for Individual Customers using Nielsen's Attributes of Usability

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Abstract

Gudang Madu Sumatera (GMS) is a sustainable integrated beekeeping company established with the aim of empowering communities in the forest areas of Indonesia. To market its products more effectively, GMS designed a website to provide information about the company and its products, making it easier and more accessible to a wider audience. Therefore, a website with an effective design and functionality is needed to facilitate both customers and the company. Ensuring good usability is crucial for the website's sustainability. Usability testing is a method used to ensure the quality of an application. The usability testing to be conducted will focus on usability aspects based on ISO 9126, which serves as a benchmark for determining the website's success. The usability evaluation will be conducted using the usability testing method, interpreting each usability factor measurement based on ISO 9126 and the Nielsen Model questionnaire. The data was analyzed using SPSS and SmartPLS. Based on the results of these analyses, it was found that respondents agree with the statements in the questionnaire, as evidenced by the mean values of all eight variables falling within the range of $3.68 \leq x \leq 5.00$. Therefore, respondents' assessments or perceptions of the usability of the Gudang Madu Sumatra website are positive.

Keywords: ISO 9126; Nielsen model; usability testing; website; website functionality.

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1. Introduction

One of the key methods in evaluating the user experience (UX) of software, websites, or created products is usability testing. This method involves direct testing with a group of users or potential consumers to assess how effective, efficient, and satisfying the user experience is when interacting with the product. In this process, the testing is designed to replicate real-world situations as closely as possible, allowing observers to gain a direct understanding of how users truly interact with the product's interface and features. Usability testing is not only an important part of the product development cycle but also crucial for building user-friendly products. The results of these tests help the development team identify potential issues and design the necessary improvements or changes to enhance the quality and user satisfaction when using the product (Kurniawan & Yuamita, 2023).

Quality, according to ISO 9126, is the combination of all features and characteristics of a product or service. This standard provides external quality metrics to measure software quality elements that apply to software products that can be run during testing or when operating at later stages of development and after entering the operational process. In other words, ISO 9126 offers a way to measure various aspects of software quality from an external perspective, both during testing and in use (Wang et al., 2019). ISO 9126 has a key concept called quality in use, which emphasizes the importance of assessing software quality from the end-user's perspective—how the software delivers value to the user when it is in use (Supriyono, 2019).

A website is a collection of pages that contain various types of information, including text, images, animations, sound, video, or a combination of these. This information can be categorized into two types: static, which means it remains unchanged, or dynamic, which changes based on user interaction or over time. These pages are interconnected through

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a network of hyperlinks or links. In other words, a website consists of multiple interlinked pages that form a structure or framework, allowing users to easily access content (Maharani et al., 2021). The information on the page includes various types of digital data, such as text, images, animations, sound, and video, organized neatly and systematically. To ensure that the page can be accessed by users and displayed properly, developers use a standard language called HTML (Hypertext Markup Language) (Susilawati et al., 2020). A static website does not allow visitors to interact or participate; they can only view the content without leaving comments or interacting. Content updates are done manually by the owner. Static websites often load faster because they don't require server processing, making them easier to manage and more secure as they are less frequently targeted by hackers. However, they lack flexibility and interactivity needed for sites requiring complex user interactions or real-time content updates. For such purposes, dynamic websites using server-side programming languages are more suitable. A dynamic website allows visitors to interact with each other and the site. Visitors can perform various actions such as filling out forms, registering as members, leaving comments, and conducting online transactions. Supported by a database, a dynamic website enables automatic data storage and processing, allowing real-time content updates. This means the website owner can change the content without altering the page scripts themselves (Kesuma & Sri, 2022).

Usability testing for a website is crucial for software developers to create an appealing and user-friendly interface that facilitates ease of use for all users (Afriansyah et al., 2022). The most important indicators for evaluating a website are its design, usability, and user satisfaction. When designing a website, the most critical factor to consider is user preference. User preferences can be measured through interviews or questionnaires (Raka & Setyohadi, 2021). The criteria for assessing website usability, from most to least significant, include content, navigation, ease of use and communication, design, and architecture (Puspitaningtyas, 2022). A website must be easy to use because visitors are likely to avoid returning if it is difficult to navigate. If a website has a high level of usability, users can either feel pleased or frustrated, depending on how easily and efficiently they can interact with its content and features. Websites with high usability are likely to become more popular, as users tend to return and recommend the site to others. Therefore, the aim of this study is to evaluate the usability level of the website, as this is a crucial component in influencing user experience and the overall success of the website (Ahsyar & Afani, 2019).

Usability, as defined by the International Organization for Standardization (ISO), is the extent to which a product can be used by specific users to achieve specific goals effectively and efficiently, while ensuring a high level of satisfaction during its use (Guidance on Usability, 1998). ISO/IEC 9126 was created by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) to address various aspects of software quality, including portability, efficiency, usability, functionality, and maintainability. In ISO 9126, usability is defined through several sub-characteristics of software. Understandability refers to how easily users can comprehend the software. Learnability denotes the ease with which new users can learn to use the software. Operability describes the simplicity with which users can operate the software. Lastly, attractiveness pertains to the software's ability to draw users' attention through its appealing design or appearance (*International Organization for Standardization*, 2001).

According to Jakob Nielsen, usability is a concept that encompasses multiple dimensions within a user interface. Generally, usability components consist of five primary attributes. First, learnability refers to how easily a system can be learned so that users can quickly accomplish tasks using it. Second, efficiency relates to the system's ability to be easily remembered once users understand its workings, enhancing productivity. Third, memorability emphasizes the importance of a system being easily recalled so that users can return to it after a long period without needing to relearn it. Fourth, errors refer to maintaining a low error rate in system use, and if errors do occur, the system should be easily recoverable and return to normal operation. Lastly, satisfaction reflects how enjoyable and satisfying the system is for users to use, ensuring they feel content and happy using it (Nielsen, 1993).

In this study, data analysis was conducted using SPSS and the Partial Least Square (PLS) technique. SPSS is one of the many programs utilized in education due to technological advancements. This program is a powerful statistical calculation tool that facilitates data analysis and is used in quantitative data research as a statistical measurement tool (Suyoto et al., 2019). Partial Least Square (PLS) is a statistical technique used to build predictive models with an approach that focuses on the relationships between variables. PLS can be used to analyze latent variables, which are variables that cannot be directly measured but are formed by several indicators or manifest variables (Hustia et al., 2021).

2. Method

The focus of this research is on customers of Gudang Madu Sumatra who have used Gudang Madu Sumatra's website. Data collection was conducted by distributing a questionnaire via Google Form online. The study was carried out from April 2024 until sufficient data was collected to meet the research requirements. Data testing was performed using the

SPSS application, while testing the relationships between latent variables was conducted using the SmartPLS application.

In research, the elements or attributes that are observed, measured, or analyzed are called research variables. These variables are derived from the research subjects, which can be people, objects, transactions, or events. They indicate the conditions or values held by the research subjects and provide a description of the characteristics or traits of these subjects. For instance, research on the relationships, differences, or impacts between the research subject and other research objects often involves these variables (Ulfa, 2021). In this study, the independent variables include the values of understandability, learnability, operability, attractiveness, efficiency, memorability, error, and satisfaction. The dependent variable in this study is usability.

3. Result and Discussion

In the data testing phase of the research, validity and reliability tests were conducted on the results obtained from distributing the questionnaire. This testing process utilized the SPSS application. The objective of these tests was to determine whether the questionnaire results were valid and reliable. The study involved testing 30 questionnaire respondents to assess if the data could be used for further research purposes.

Validity testing is a process used to determine how well a measurement tool (such as a scale, questionnaire, or test) measures what it is intended to measure. The primary function of validity testing is to ensure that the measurement tool used in research or evaluation accurately represents the concept or structure being measured (Amanda et al., 2019). In this study, validity testing was conducted using Pearson's product-moment correlation to determine if each statement item in the measurement instrument correlates significantly with the overall scores of statement categories. In this test, the correlation coefficient (r) was computed for each statement item using SPSS. A correlation coefficient (r) value greater than 0.361 indicates that the item statement is valid and suitable for use in the measurement instrument. The results of the validity testing using SPSS are presented on Table 1.

Table 1. Validity testing of questionnaire items in usability testing

Code	Pearson Correlation	r-tabel	Explanation
UN1	0,602	0,361	Valid
UN2	0,542	0,361	Valid
UN3	0,548	0,361	Valid
LE1	0,636	0,361	Valid
LE2	0,654	0,361	Valid
LE3	0,599	0,361	Valid
LE4	0,713	0,361	Valid
OP1	0,670	0,361	Valid
OP2	0,751	0,361	Valid
AT1	0,780	0,361	Valid
AT2	0,651	0,361	Valid
EF1	0,731	0,361	Valid
EF2	0,653	0,361	Valid
EF3	0,799	0,361	Valid
MEM1	0,673	0,361	Valid
MEM2	0,516	0,361	Valid
MEM3	0,707	0,361	Valid

Code	Pearson Correlation	r-tabel	Explanation
ER1	0,675	0,361	Valid
ER2	0,781	0,361	Valid
ER3	0.677	0,361	Valid
SA1	0.769	0,361	Valid
SA2	0.744	0,361	Valid
SA3	0.6	0,361	Valid
SA4	0.758	0,361	Valid
US1	0.638	0,361	Valid
US2	0.670	0,361	Valid
US3	0.663	0,361	Valid
US4	0.694	0,361	Valid

From the results of the validity testing, it can be concluded that all variables in the questionnaire data for usability testing of the Gudang Madu Sumatra website are valid. This conclusion is drawn because the Pearson correlation coefficients for all variables are greater than the critical r-value. This indicates that each variable in the questionnaire effectively measures the intended aspects of usability, confirming their reliability and suitability for further analysis and interpretation.

Reliability testing is used to evaluate the consistency of a measurement tool, or the extent to which it can be trusted to provide the same results upon repeated measurements. In other words, reliability testing aims to determine whether the measurement tool can consistently produce similar results when used multiple times (Slamet & Wahyuningsih, 2022). The criterion for reliable data is typically a Cronbach's Alpha value greater than 0.6. In this research, reliability testing using the SPSS application produced shown on Figure 1.

Reliability Statistics

Cronbach's Alpha	N of Items
.955	28

Figure 1. Reliability testing results

From the results figure of the reliability testing, it can be concluded that all variables used in the questionnaire evaluating the usability of the Gudang Madu Sumatra website are reliable. This conclusion is drawn because the reliability testing showed that all variables in the questionnaire have a Cronbach's Alpha value of 0.955, which exceeds the minimum criterion of 0.6. Therefore, the data used can be considered reliable.

In this study, a total of 30 respondents were determined to be needed. The questionnaire distribution has successfully achieved the required number of respondents. Figure 2 shown the percentage of respondents based on gender.

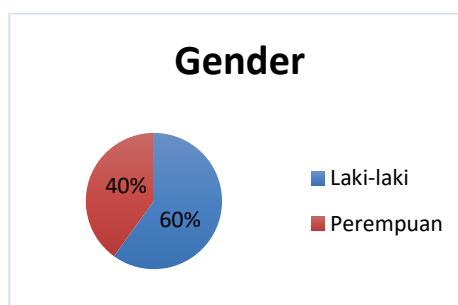


Figure 2. Gender percentage

The data obtained from the diagram reveals that 60% of the respondents are male, totaling 18 individuals, while 40% are female, totaling 12 individuals. This distribution indicates a slightly higher representation of male respondents compared to female respondents in the survey sample evaluating the usability of the Gudang Madu Sumatra website.

In this study, a total of 30 respondents were determined to be needed. The questionnaire distribution has successfully achieved the required number of respondents. Figure 3 showing the percentage of respondents based on age.

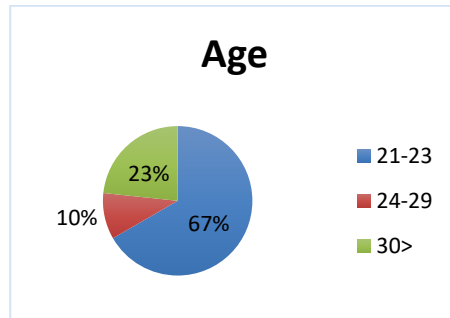


Figure 3. Age Percentage

Based on the data from the Figure 3, the distribution of respondent ages is as follows: 67% of respondents fall within the 21-23 age range, comprising 20 individuals. Additionally, 10% of respondents are in the 24-29 age range, totaling 3 individuals. The remaining 23% of respondents are over 30 years old, accounting for 7 individuals. This breakdown illustrates that a significant majority of respondents are between 21 and 23 years old, with a smaller proportion in older age categories in the survey evaluating the usability of the Gudang Madu Sumatra website.

In this study, mean, median, and mode are categories of values used for drawing descriptive statistics. Although all three calculations can be easily performed using SPSS, the mean, or average value, holds particular significance for this research. The mean indicates the level of overall tendency or agreement among users regarding the statements listed in the questionnaire. Furthermore, based on the range of values, this mean is categorized into three categories. This categorization is done to evaluate the questionnaire results and determine the average respondent score for each variable. These categories help us understand the general tendencies of respondents for each questionnaire variable. The following is the formulation for the mean value scale:

$$Interval = \frac{Highest\ Score - Lowest\ Score}{Number\ of\ Classification}$$

$$Interval = \frac{5 - 1}{3} = 1,33$$

Average Interval	Scoring
$1,00 \leq x \leq 2,33$	Bad
$2,34 \leq x \leq 3,67$	Good
$3,68 \leq x \leq 5,00$	Great

Figure 4. Scoring range

Here are the processed questionnaire data and indicator variables that have been analyzed using SPSS and presented on Table 2.

Based on the calculations shown in Table 2, the variable Understandability obtained a mean value of 4.03. It can be concluded that respondents agree with the statements related to Understandability because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range indicates a favorable level of agreement among respondents regarding the understandability aspect evaluated in the questionnaire.

Tabel 2. Mean understandability variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
UN1	0	0	1	26	3	4.06
UN2	0	1	1	24	4	4.03
UN3	0	0	3	24	3	4.00

Tabel 3. Mean learnability variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
LE1	0	0	6	20	4	3.93
LE2	0	0	6	20	4	3.93
LE3	0	0	4	20	6	4.06
LE4	0	0	2	21	7	4.16

Based on the calculations shown in Table 3, the variable Learnability obtained a mean value of 3.97. It can be concluded that respondents agree with the statements related to Learnability because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range suggests a high level of agreement among respondents regarding the ease of learning aspect evaluated in the questionnaire.

Tabel 4. Mean operability variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
OP1	0	0	6	21	3	3.90
OP2	0	0	7	19	4	3.90

Based on the calculations seen in Table 4, the variable Operability obtained a mean value of 3.90. It can be concluded that respondents agree with the statements related to Operability because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range indicates a favorable level of agreement among respondents regarding the ease of operating the system as evaluated in the questionnaire.

Tabel 5. Mean attractiveness variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
AT1	0	0	7	21	2	3.83
AT2	0	0	13	15	2	3.63

Based on the calculations observed in Table 5, the variable Attractiveness obtained a mean value of 3.73. It can be concluded that respondents agree with the statements related to Attractiveness because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range indicates a positive level of agreement among respondents regarding the attractiveness aspect evaluated in the questionnaire.

Based on the calculations shown in Table 6, the variable Efficiency obtained a mean value of 3.92. It can be concluded that respondents agree with the statements related to Efficiency because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range suggests a favorable level of agreement among respondents regarding the efficiency aspect evaluated in the questionnaire.

Tabel 6. Mean efficiency variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
EF1	0	1	4	23	2	3.86
EF2	0	0	3	24	3	4.00
EF3	0	0	5	23	2	3.90

Tabel 7. Mean memorability variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
MEM1	0	0	4	24	2	3.93
MEM2	0	0	14	15	1	3.56
MEM3	0	0	16	13	1	3.50

Based on the calculations seen in Table 7, the variable Memorability obtained a mean value of 3.66. It can be concluded that respondents agree with the statements related to Memorability because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This indicates a high level of agreement among respondents regarding the ease with which they can remember and use the system, as assessed in the questionnaire.

Tabel 8. Mean error variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
ER1	0	0	6	22	2	3.86
ER2	0	0	3	24	3	4.00
ER3	0	1	3	24	2	3.90

Based on the calculations shown in Table 8, the variable Error obtained a mean value of 3.92. It can be concluded that respondents agree with the statements related to Error because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range indicates a favorable level of agreement among respondents regarding the low occurrence of errors in the system, as assessed in the questionnaire.

Tabel 9. Mean Satisfaction variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
SA1	0	0	7	22	1	3.80
SA2	0	0	12	17	1	3.63
SA3	0	0	5	23	2	3.90
SA4	0	0	13	16	1	3.60

Based on the calculations shown in Table 9, the variable Satisfaction obtained a mean value of 3.78. It can be concluded that respondents agree with the statements related to Satisfaction because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range indicates a positive level of agreement among respondents regarding their satisfaction with the system, as assessed in the questionnaire.

Tabel 10. Mean usability variable indicator

Code	Answers Distribution					Mean
	STS	TS	N	S	SS	
US1	0	0	18	11	1	3.43
US2	0	0	8	20	2	3.80
US3	0	0	4	22	4	4.00
US4	0	1	10	17	2	3.67

Based on the calculations shown in Table 10, the variable Usability obtained a mean value of 3.74. It can be concluded that respondents agree with the statements related to Usability because the mean value falls within the range of $3.68 \leq x \leq 5.00$. This range indicates a positive level of agreement among respondents regarding the usability of the system, as evaluated in the questionnaire.

Path coefficient is a parameter in Structural Equation Modeling (SEM) that measures the strength and direction of the relationship between latent variables in the structural model. It is displayed as a standardized regression coefficient and indicates the direct influence of one latent variable on another. Path coefficients range between -1 and 1, where positive values indicate a positive relationship and negative values indicate a negative relationship. The magnitude of the path coefficient reflects the strength of the direct influence between two variables: the larger the absolute value of the path coefficient, the stronger the direct influence (Suyoto et al., 2019). Below is the output of Path Coefficients using SmartPLS.

Tabel 11. Path Coefficient

Variabel	Path Coefficient
Attractiveness →Usability	0.446
Efficiency →Usability	0.585
Error →Usability	0.617
Learnability →Usability	0.694
Memorability →Usability	0.722
Operability →Usability	0.595
Satisfaction →Usability	0.750
Understandability → Usability	0.487

From the table 11, it can be observed that all latent variables in this study have positive path coefficient values. This indicates that all eight independent variables have a positive relationship or influence on the dependent variables. Therefore, based on these results, it can be concluded that the independent variables positively impact the dependent variables.

4. Conclusion

Based on the discussion and data analysis results, it can be concluded that respondents agree with the statements in the questionnaire, as evidenced by the mean values of all eight variables falling within the range of $3.68 \leq x \leq 5.00$. Therefore, respondents' assessments or perceptions of the usability of the Gudang Madu Sumatra website are positive.

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