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Evaluation of Computer-Based Testing Website Quality Using the DeLone and McLean Information System Success Model

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Abstract – The rapid development of information technology has significantly impacted the education sector, particularly in the implementation of computer-based examination systems. This study aims to analyze and evaluate the quality of a Computer-Based Testing (CBT) website at SMK Bangun Bangsa using the DeLone and McLean Information System Success Model. A quantitative approach was employed by collecting primary data through questionnaires distributed to 260 students from grades X and XI of SMK Bangun Bangsa who had experience using the CBT system. The respondents represented various demographic backgrounds in terms of gender, age, and academic majors. The variables analyzed include system quality, information quality, service quality, user satisfaction, and net benefits. Data analysis was conducted using descriptive statistical methods, supported by validity and reliability testing to ensure the accuracy and consistency of the research instrument. The results indicate that the CBT system has generally performed well. System quality obtained a score of 75.4% (good category), indicating that the system is easy to use despite minor technical issues. Information quality achieved 77.7% (very good), reflecting that the system provides accurate, relevant, and understandable information. Service quality recorded the lowest score of 72.2% (good), suggesting the need for improvement in security and technical support. Meanwhile, user satisfaction reached 81.6% and net benefits 80%, both categorized as very good, indicating that the system enhances efficiency and provides a positive user experience. This study contributes to evaluating the effectiveness of CBT systems in vocational education environments and highlights the importance of improving service quality and system reliability to achieve optimal system performance. Future research is recommended to expand the study scope and integrate additional models for deeper analysis.

Keywords – Computer Based Testing, DeLone and McLean, System Quality, User Satisfaction, Information Systems Success

I. INTRODUCTION

The development of information technology in the past few decades has shown a very significant increase and has a wide impact on various sectors, including education [1] [2]. The implementation of information systems has proven capable of improving work effectiveness, time usage efficiency, and resource optimization within an organization [3] [4]. In the educational environment, especially at the secondary school and higher education levels, the use of information systems not only supports administrative processes but also plays an important role in improving the quality of learning and the evaluation of learning outcomes.

One of the forms of learning evaluation that is routinely carried out is the Final Semester Examination (UAS) [5]. This exam serves as an instrument to measure the level of understanding and cognitive abilities of students after undergoing the learning process in a certain period [6]. Conventionally, the implementation of UAS is carried out using the Paper Based Test (PBT) method, which relies on paper media and writing tools [7]. However, this method is considered to have various limitations, such as the potential for errors in correction, the risk of question leakage, and inefficient use of resources [8].

Along with technological advancements, computer-based evaluation systems or Computer Based Testing (CBT) have begun to be adopted as a more modern and efficient alternative. CBT allows exams to be conducted flexibly, both in terms of time and location, and can produce evaluation results more quickly and accurately [9]. In addition, this system can also minimize the potential for cheating through question randomization and improve exam data security [3]. Nevertheless, the implementation of CBT still faces challenges, especially related to the level of user adaptation, where some students are still accustomed to using simple platforms such as Google Forms in conducting exams [10].

SMK Bangun Bangsa is one of the educational institutions that has implemented a computer-based examination system since 2019. The implementation of this system provides various conveniences, including in exam data management, speeding up the assessment process, and increasing the accuracy of evaluation results. In addition, the CBT system also contributes to reducing human error in the correction process and curbing the potential for cheating during exams. However, the success of implementing the system is not only determined by the presence of technology, but also by the quality of the system, the quality of the information produced, and the quality of the service experienced by users.

To measure the success level of an information system, the DeLone and McLean model is one of the evaluation frameworks widely used. This model assesses system success based on several key dimensions, namely system quality, information quality, service quality, usage level, user satisfaction, and net benefits [11] [12]. This model is considered comprehensive because it not only measures technical aspects but also takes into account users' perceptions and experiences in using the system [13].

Several previous studies have shown that the DeLone and McLean model is effective in evaluating the success of

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various information systems. Research by [14] shows that system quality affects the level of use of health center management information systems. Furthermore, [15] found that the success of e-learning systems is influenced by ease of use and system display quality. Another study by [16] confirmed that system, information, and service quality contribute to improving the effectiveness of academic information systems. In addition, studies by [17] [18] also showed that most variables in the DeLone and McLean model have a significant effect on satisfaction and the success of information system usage.

Although various studies have been conducted, research that specifically evaluates the quality of computer-based examination systems at the vocational high school level is still relatively limited. In addition, the relationship between system quality, information quality, and service quality in influencing user satisfaction in CBT implementation requires further investigation. Based on the identified gap, this study aims to analyze and evaluate the quality of the Computer-Based Testing (CBT) examination website at SMK Bangun Bangsa using the DeLone and McLean model. This study focuses on examining the influence of system quality, information quality, and service quality on user satisfaction, as well as identifying the net benefits obtained from the implementation of the system.

The results of this study are expected to provide a comprehensive overview of the success level of CBT system implementation, and at the same time serve as a basis for the development and improvement of computer-based examination systems in the future, especially in the vocational secondary education environment.

II. RESEARCH METHODOLOGY

A. Research Design

This study employs a quantitative approach with a descriptive method. The quantitative approach is used to measure the level of system quality and user satisfaction based on numerical data obtained from respondents [19] [20]. The descriptive method aims to provide a systematic and accurate description of the characteristics of the studied variables [20] [21].

B. Population and Sample

The population in this study consists of all students of SMK Bangun Bangsa who have used the Computer-Based Testing (CBT) system. The sample was determined using a sampling technique accidental sampling that is sampling based on students who happen to be available and willing to fill out the questionnaire. The sample size was determined using the Slovin formula:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

Where: n = sample size, N = population size, e = margin of error. How to determine the total number of samples needed from a population is determined by applying the Slovin formula. The calculation formula using the population of SMK Bangun Bangsa, which consists of 742 students, is as follows:

$$n = \frac{742}{1+742\ (0.05)^2}$$

$$n = \frac{742}{1+742\ 0.0025}$$

$$n = \frac{742}{1+1.855}$$

$$n = \frac{742}{2.855} = 259.8\ rounded\ to\ 260$$

Therefore, the number of samples required is 260 out of 742 students.

C. Data Collection Techniques

The data in this study consists of primary data obtained directly from respondents. The data collection techniques used include: Observation, conducted by directly observing the use of the computer-based exam system in the school environment. Interviews, conducted with school personnel such as principals, teachers, and students to obtain information related to their experience using the system. Literature study, conducted by reviewing literature such as scientific journals, books, and previous relevant research. Questionnaires, as the main research instrument developed based on the indicators of the DeLone and McLean model. The questionnaire uses a 4-point Likert scale, namely: Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1).

Table 1. Likert scale score weights

Code	Description	Score
SS	Strongly Agree	4
S	Agree	3
TS	Disagree	2
STS	Strongly Disagree	1

D. Research Procedure

This research was carried out through several structured stages, namely: (a) problem formulation based on empirical conditions and gaps in previous research; (b) data collection through observation, interviews, questionnaires, and literature study; (c) literature review as a theoretical foundation; (d) data analysis using statistical software; (e) testing of research instruments; and (f) preparation of the research report systematically.

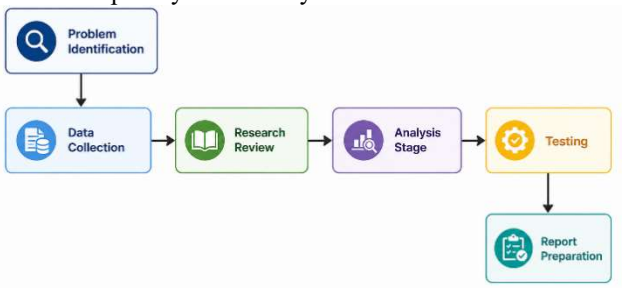

Figure. 1 Research Method Stages.

E. Research Model

This study adopts the [22] information system success model as the analytical framework. This model is used to evaluate information system success through several main constructs, namely system quality, information quality, service quality, user satisfaction, and net benefit. The use variable is not included in this study because the system being examined is mandatory for users.

Each variable is measured using indicators that have been developed in previous studies, such as ease of use, access speed, system reliability, information accuracy, information relevance, service responsiveness, as well as

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the impact of system use on user effectiveness and productivity.

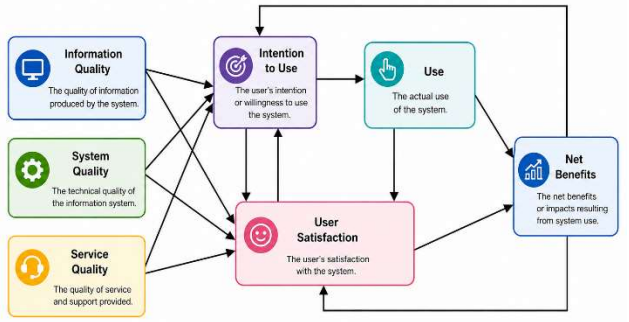

Figure 2. Information system success model of DeLone and McLean

F. Population and Sample

The population in this study consisted of all grade X and XI students at SMK Bangun Bangsa who had used the computer-based examination system, totaling 742 students. These students came from four academic majors, namely Computer and Network Engineering, Office Management, Financial Accounting, and Marketing. The respondents also represented diverse demographic characteristics in terms of gender and age, providing a broad representation of CBT system users within the school. The sampling technique used a non-probability sampling method with a accidental sampling approach, which is the selection of respondents based on certain criteria relevant to the research objectives [23] [24] [25].

The determination of the sample size used Slovin's formula with an error rate of 5% [26] [27], resulting in a sample of 260 respondents. This number is considered representative to describe the overall condition of the population.

G. Data Analysis Techniques

Data analysis was conducted using SPSS version 26 software with several stages as follows:

1) Validity Test
   The validity test was conducted to determine the extent to which the research instrument is able to measure the intended variables [28] [29]. The test was carried out by comparing the calculated r value with the table r value. An item is declared valid if the calculated r value is greater than the table r value [30].
2) Reliability Test
   The reliability test aims to measure the consistency of the research instrument. The test was done using the Cronbach's Alpha coefficient. An instrument is declared reliable if the Cronbach's Alpha value is greater than 0.70 [31] [32] [33].
3) Descriptive Analysis
   The collected data was analyzed descriptively by calculating the mean and percentage of each variable. The analysis results are presented in tables to facilitate data interpretation.

H. Research Instrument

The research instrument consists of a questionnaire prepared based on indicators from each variable in the DeLone and McLean model [22]. The indicators used include system quality aspects (ease of use, access speed, reliability), information quality (accuracy, relevance, completeness), service quality (responsiveness, technical support), user satisfaction, and the net benefits perceived by users.

Table 2. Research Variables and Indicators

Variable	Indicators
System Quality	- Ease of use - Response time - System reliability - Interface design - System security
Information Quality	- Accuracy - Relevance - Completeness - Understandability - Timeliness
Service Quality	- Responsiveness - Technical support - Empathy - Service reliability
Use / Intention to Use	- Frequency of use - Intensity of use - Intention to continue use
Net Benefits	- Improved effectiveness - Improved productivity - Cost/time saving - Better decision making

III. RESULTS AND DISCUSSION

A. Results

This study involved 260 students of SMK Bangun Bangsa who have used the computer-based testing system (Computer Based Testing/CBT). Before further analysis was carried out, instrument testing was conducted to ensure the quality of the data used.

B. Research Instrument Test

The results of the validity test showed that all questionnaire items had a calculated r value greater than the r table (0.121), so all items were declared valid. In addition, the results of the reliability test showed that all variables had a Cronbach's Alpha value above 0.70, which means the research instrument is consistent and reliable.

Validity testing is carried out to ensure that each statement item in the questionnaire is able to measure the researched variable accurately. This test uses the Pearson Product Moment method by comparing the calculated r-value with the table r-value. Based on the number of respondents totaling 260, the table r-value obtained is 0.121 at a 5% significance level. An item is declared valid if the calculated r-value is greater than the table r-value. The results of the validity testing for all research variables are presented in Table 3.

Table 3. Validity Test Results

Variable	Item	r-value	r-table (5%)	Criteria
System Quality	1	0.749	0.121	Valid
	2	0.698	0.121	Valid
	3	0.754	0.121	Valid
	4	0.689	0.121	Valid
	5	0.580	0.121	Valid
	6	0.758	0.121	Valid

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Information Quality	1	0.804	0.121	Valid
	2	0.865	0.121	Valid
	3	0.818	0.121	Valid
	4	0.838	0.121	Valid
	5	0.824	0.121	Valid
Service Quality	1	0.801	0.121	Valid
	2	0.823	0.121	Valid
	3	0.849	0.121	Valid
User Satisfaction	1	0.875	0.121	Valid
	2	0.904	0.121	Valid
	3	0.845	0.121	Valid
Net enefits	1	0.868	0.121	Valid
	2	0.872	0.121	Valid
	3	0.867	0.121	Valid

Based on Table 3, it can be seen that all statement items for the variables of system quality, information quality, service quality, user satisfaction, and net benefits have r-calculated values greater than the r-table (0.121). Therefore, all questionnaire items are declared valid and suitable for use as data collection instruments. This result indicates that each indicator used has been able to accurately represent the construct being measured.

After the instrument is declared valid, the next stage is to conduct a reliability test to determine the level of consistency of the research instrument. The reliability test is carried out using the Cronbach's Alpha method. A variable is considered reliable if it has a Cronbach's Alpha value greater than 0.70. The results of the reliability test for each research variable are presented in table 4.

Table 4. Reliability Test Results

No	Variable	Cronbach Alpha	Criteria	Description
1	System Quality	0.791	> 0.70	Reliabel
2	Information Quality	0.885		Reliabel
3	Service Quality	0.762		Reliabel
4	User Satisfaction	0.846		Reliabel
5	Net enefits	0.836		Reliabel

Based on Table 4, all variables in this study have a Cronbach's Alpha value above 0.70. This indicates that the research instrument has a good level of consistency and can be trusted (reliable). Therefore, the questionnaire used in this study is deemed suitable for use in the further data analysis process.

C. Respondent Characteristics

The characteristics of respondents in this study are presented in Table 5 Based on the table, the majority of respondents were male, accounting for 58.5%, while females accounted for 41.5%. In terms of age, respondents were dominated by 17-year-olds at 59.6%, indicating that most respondents were within an age range active in technology use. Based on grade level, the majority of respondents were from grade XI at 73.8%, while grade X accounted for 26.2%. This indicates that respondents had sufficient experience in using computer-based examination systems. In terms of majors, most respondents came from the Computer Network and Telecommunications major (53.1%), followed by Office Management (25%), Financial Accounting (19.2%), and Marketing (2.7%).

Overall, the characteristics of the respondents indicate that the majority of users have a background that is quite relevant to the use of technology, thus enabling them to provide representative assessments of the quality of the computer-based examination system.

To provide a clearer demographic profile of the respondents, this study analyzed several demographic characteristics, including gender, age, grade level, and academic major. These characteristics are important to ensure that the respondents adequately represent the population of CBT system users at SMK Bangun Bangsa.

Table 5. Characteristics of Respondents

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	152	58.5
	Female	108	41.5
Age	16 Years Old	51	19.6
	17 Years Old	155	59.6
	18 Years Old	48	18.5
	19 Years Old	6	2.3
Class	Grade X	68	26.2
	Grade XI	192	73.8
Major	Computer and Network Engineering	138	53.1
	Office Management	65	25
	Financial Accounting	50	19.2
	Marketing	7	2.7
Total		260	100

D. Descriptive Analysis of Variables

Descriptive analysis was conducted to understand respondents' perceptions of the quality of the computer-based examination system based on the DeLone and McLean model. The summary of the average scores for each variable is presented in Table 6.

Table 6. Percentage of variable scores

Variable	Score	Percentage
System Quality	784.3	75.4%
Information Quality	808.4	77.7%
Service Quality	750.7	72.2%
User Satisfaction	848.7	81.6%
Net enefits	832.0	80.0%

Based on Table 6, the results are as follows:

a. System Quality received a score of 75.4% (good category). This indicates that the system is relatively easy to use, has clear navigation, and a fairly good interface. However, there are still technical issues such as errors experienced by some users.
b. Information Quality received a score of 77.7% (very good category). The information presented is considered accurate, relevant, easy to understand, and timely.
c. Service Quality received a score of 72.2% (good category) and is the lowest compared to the other variables. This shows that the service aspect,

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particularly related to system security and technical stability, still needs improvement.

d. User Satisfaction received the highest score of 81.6% (very good category). This indicates that the CBT system is able to provide a positive experience for users.
e. Net Benefits obtained a value of 80% (very good category), which indicates that the system has a positive impact on the efficiency and effectiveness of exam implementation.

To provide a more detailed overview of the contribution of each indicator to the research variables, a summary of the dominant indicators for each variable is presented. This summary aims to identify the most influential aspects as well as aspects that still need to be improved in the implementation of the computer-based examination system. The results of the indicator summary are presented in Table 7.

Table 7. Summary of Indicators per Variable

Variable	Dominant Indicator	Percentage (%)	Category	Notes
System Quality	Ease of use	90.4	Very Good	System is easy to understand
	System stability	59.3	Good	Errors still occur
Information Quality	Ease of understanding	88	Very Good	Information is clear
	Timeliness	84.7	Very Good	Information is up-to-date
Service Quality	Security of use	82	Very Good	Safe to use
	Data privacy	73.5	Good	Needs improvement
User Satisfaction	Ease of use	91.2	Very Good	Easier to use than before
	Effectiveness of use	90.4	Very Good	Process is more efficient
Net Benefits	Time efficiency	89.2	Very Good	Saves time
	Effectiveness of use	88.5	Very Good	Supports outcomes

Based on Table 7, it can be seen that for the system quality variable, the ease of use indicator obtained the highest score, which indicates that the system has been well designed and is easy for users to understand. However, the system stability indicator still received a relatively lower score, which suggests that there are technical issues that need to be addressed. For the information quality variable, all indicators fall into the very good category, particularly in terms of ease of understanding and timeliness. This indicates that the system is able to provide information that meets users' needs optimally. Furthermore, for the service quality variable, the aspect of usage security received a high score, but personal data security still needs improvement. For the user satisfaction and net benefit variable, all indicators show very good scores, indicating that the system provides a positive experience as well as tangible benefits for users.

Overall, Table 7 reinforces the results in Table 6, that although the system has been running well, aspects of system stability and service quality still remain priority areas for further development.

E. Discussion

Based on the research results presented in Table 6 and supported by the indicator details in Table 7, it can be analyzed that the success of implementing a computer-based examination system at SMK Bangun Bangsa is influenced by a combination of system quality, information, services, and users' perceptions of the benefits gained. These findings are in line with the DeLone and McLean information systems success model, which states that system quality, information, and service are the main determinants in shaping user satisfaction and system benefits.

First, in terms of system quality, a score of 75.4% (good category) indicates that the system generally meets user needs. This is reinforced by Table 5, which shows that the ease of use indicator received a very high score (90.4%), indicating that the system is user-friendly and easy to understand. However, the system stability indicator only reached 59.3%, which indicates that there are still technical disruptions. These findings show that although the system has been optimal in terms of design and usability, technical factors such as system reliability still pose challenges that can affect the overall user experience. This result is in line with the research of [34] which asserts that good system quality must be supported by stability and reliability to increase the level of system usage.

Second, the quality of information scored 77.7% (very good category), indicating that the system is capable of providing relevant and high-quality information. Based on Table 5, the indicators of ease of understanding (88%) and timeliness (84.7%) are the dominant factors supporting this assessment. This indicates that users not only receive information, but are also able to understand and utilize it effectively in the context of examinations. This finding is in line with [15] who stated that good information quality will enhance users' positive perceptions of the system, especially in terms of clarity and ease of access to information.

Third, in terms of service quality, the lowest score was obtained, which is 72.2% (good category). Further analysis in Table 5 shows a gap between the perception of usage safety (82%) and personal data security (73.5%). This indicates that although users feel fairly safe when using the system, there are still concerns regarding the protection of personal data. Thus, the service aspect - particularly security and technical support - becomes an area that requires more attention in system development. This finding is supported by research by [16], which emphasizes that service quality, especially in terms of security and technical support, is an important factor in increasing user trust and satisfaction.

Fourth, user satisfaction achieved the highest score of 81.6% (very good category). This is supported by the indicators of ease of use (91.2%) and exam effectiveness (90.4%) in Table 5, which shows that the system is able to provide a better experience compared to conventional exam methods. This high user satisfaction indicates that the system has successfully met user expectations in both functional and operational aspects. These results are in line with the research of [18] [11], which states that user satisfaction is greatly influenced by ease of use and the system's effectiveness in supporting user activities.

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Fifth, the net benefits also show a high value of 80% (very good category). Based on Table 5, the indicators of time efficiency (89.2%) and exam implementation effectiveness (88.5%) are the main factors contributing to this value. This indicates that the CBT system not only improves the efficiency of the exam process but also has a positive impact on students' learning outcomes. This finding aligns with the research of [17], which states that the benefits of information systems can be seen from increased productivity, efficiency, and the quality of results obtained by users.

Overall, the analysis in Table 4 and Table 5 shows that the success of a computer-based examination system is not determined by a single factor, but rather by the interaction between system quality, information quality, and service quality, which ultimately affects user satisfaction and perceived benefits. This aligns with the DeLone and McLean model framework, which emphasizes the causal relationships between variables in determining information system success. Although most variables fall into the good to very good category, this study identifies that improving system stability and service quality, particularly in aspects of security and reliability, is a key factor in achieving a more optimal system success.

IV. CONCLUSION

Based on the results of the analysis using the DeLone and McLean model, this study shows that the computer-based testing (CBT) system at SMK Bangun Bangsa has generally been running well and is able to provide satisfaction and benefits to its users. The system quality is in the good category, indicating that the system is easy to use and has a supportive interface, although there are still issues with technical stability. Information quality obtained a very good category, indicating that the information presented is accurate, relevant, and easy to understand. Meanwhile, service quality is the relatively lowest aspect, although still in the good category, indicating the need for improvements in data security and technical support. On the other hand, user satisfaction and net benefits show very good results, indicating that the CBT system is able to improve efficiency, effectiveness, and provide a positive experience for users. Overall, the success of the system is influenced by the interaction between system quality, information, and services, which shape user satisfaction and perceived benefits. For further research, it is recommended to conduct experiments by expanding the research subjects to various educational institutions to obtain broader generalization of results, and to combine the DeLone and McLean model with other approaches such as the Technology Acceptance Model (TAM) or the Unified Theory of Acceptance and Use of Technology (UTAUT) to analyze technology acceptance factors more comprehensively. Additionally, further experiments can also be focused on testing the improvement of system stability and strengthening data security-based services in real-time to continuously enhance the quality of the CBT system.

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