PROAKSARA

Review of Leadership, Innovation, Economic, and Management

Journal homepage: https://ojs.proaksara.com/index.php/rliem

Application of the PIECES Framework in Measuring User Satisfaction with the Final Project Management Information System (SIMANTA) in the Department of Business Administration

Fatkhur Rochman[1*], Eko Boedhi Santoso[2], Yulis Nurul Aini[3], Erlangga Andi Sukma[4]

[1-4]Politeknik Negeri Malang, Indonesia

E-mail: [3)] yulisnurulaini@polinema.ac.id

ARTICLE INFO

Article History
Received : 10.10.2025
Revised : 18.10.2025
Accepted : 28.10.2025

Article Type :
Research Article

ABSTRACT

In the era of digital transformation, higher education institutions are increasingly adopting information systems to improve administrative efficiency and service quality for students. This study analyses user satisfaction with the Final Project Management Information System (SIMANTA) in the Business Administration Department of the Malang State Polytechnic using the PIECES Framework. A quantitative descriptive method was applied by distributing questionnaires to 80 final-year students as respondents. The results of the study show that the overall level of user satisfaction is in the SATISFIED category with an average score of 3.92. Analysis per aspect reveals variations in achievement: the Service (4.20) and Information (4.10) aspects are the main strengths of the system, followed by Efficiency (4.00), which is also considered very satisfactory. Meanwhile, the Performance (3.80) and Control & Security (3.90) aspects still need improvement, particularly in terms of system stability during simultaneous access. The Economics aspect (3.50) was recorded as the area with the lowest score that requires special attention. The findings of this study identify that SIMANTA has succeeded in providing user-friendly services and quality information, but improvements are needed in the technical performance and economic value of the system. Based on the analysis results, recommendations for improvement are proposed, focusing on server performance optimisation, security mechanism enhancement, and system economic value optimisation. This research proves the effectiveness of the PIECES Framework as a comprehensive evaluation tool for identifying areas for improvement in information systems, while also providing an empirical basis for the future development of SIMANTA.

Keywords: PIECES Framework, Management Information System, User Satisfaction

1. INTRODUCTION

In today's digital age, the role of information technology in higher education has become extremely important. Management information systems (MIS) have developed into an essential component of educational institutions, contributing significantly to the efficiency and effectiveness of administrative and academic management. According to Al-Busaidi and Al-Shihi (2010), the application of information systems in higher education not only speeds up administrative processes but also improves the quality of interaction between students and academic staff. This includes everything from new student admissions to academic data management and final project facilitation.

Furthermore, the use of management information systems in managing final projects, as implemented in the SIMANTA website in the Business Administration Department, Malang State Polytechnic, demonstrates the integration of technology in key academic functions. In this system, students can access information related to final projects, submit documents, and receive feedback efficiently and transparently. As emphasised by Barnes and Vidgen (2002) in their study of WebQual, the effectiveness of information systems in higher education depends on how well the system meets user needs and how the technology is integrated into the teaching and learning process.

However, although the adoption of this technology provides many benefits, it is important to continuously assess and ensure that user needs and expectations are effectively met. The PIECES framework method, which evaluates Performance, Information, Economics, Control, Efficiency, and Service, provides a comprehensive framework for analysing and optimising the performance of information systems such as the SIMANTA website. According to Babu and Singh (2013), the application of this framework in the context of educational technology helps identify strengths and weaknesses in the system, enabling user-oriented improvements.

The Final Project Management Information System (SIMANTA) is a website-based digital platform developed specifically for the Business Administration Department at the Malang State Polytechnic. This system is designed to facilitate the management of all aspects related to student final projects, from title submission to collection and assessment of final projects. According to Oinas-Kukkonen and Agyei (2025), the use of information systems specifically designed for academic activities such as final projects can increase the efficiency of administrative and academic processes, as well as enrich the learning experience of students by providing easy access to the necessary resources.

The main objective of creating the SIMANTA website is to integrate and centralise data and processes related to final projects in a single platform that is easy to access and use. This aims to improve the transparency and accuracy of information, reduce redundancy, and speed up response times to the needs of students and lecturers. According to a recent study by Smith (2005) integrated systems such as this not only improve coordination between students and lecturers but also provide more efficient administrative support, enabling higher education institutions to allocate their resources more effectively.

The main functions of the SIMANTA website include submitting final project proposals, registering titles, tracking the review process, scheduling seminars and hearings, and storing and archiving completed final project documents. By integrating all stages of the final project process into one system, SIMANTA helps ensure that all parties involved have the latest and most accurate access to the data they need. Research by Musa et al. (2024) shows that systems such as SIMANTA can significantly improve the effectiveness of final project management and provide a more satisfying user experience for students and teaching staff.

In the context of higher education, evaluating information systems such as the SIMANTA website is a crucial step in ensuring that the technology used meets the needs and expectations of its users, namely students and lecturers. System evaluation not only helps identify potential problems and limitations but also provides insights for continuous improvement. According to Mulwa et al. (2010), systematic evaluation of educational information systems plays an important role in supporting adaptive and responsive learning processes and ensuring that technological resources are maximised to support educational goals.

The importance of system evaluation stems from the need to validate the effectiveness of technology in meeting educational objectives. As stated by Thompson (2019), by assessing how well the system meets user needs, institutions can make the necessary adjustments.

The main functions of the SIMANTA website include submitting final project proposals, registering titles, tracking the review process, scheduling seminars and hearings, and storing and archiving completed final project documents. By integrating all stages of the final project process into one system, SIMANTA helps ensure that all parties involved have the latest and most accurate access to the data they need. Research by Musa et al. (2024) shows that systems such as SIMANTA can significantly improve the effectiveness of final project management and provide a more satisfying user experience for students and teaching staff.

In the context of higher education, evaluating information systems such as the SIMANTA website is a crucial step in ensuring that the technology used meets the needs and expectations of its users, namely students and lecturers. System evaluation not only helps to identify potential problems and limitations but also provides insights for continuous improvement. According to Mulwa et al. (2010), systematic evaluation of educational information systems plays an important role in supporting adaptive and responsive learning processes and ensuring that technological resources are maximised to support educational goals.

The importance of system evaluation stems from the need to validate the effectiveness of technology in meeting educational objectives. As stated by Thompson (2019), by assessing how well the system meets user needs, institutions can make the necessary adjustments to improve performance, usability, and user

satisfaction. This evaluation is particularly important in the context of education as it can influence student academic success, administrative efficiency, and the overall reputation of the institution.

In practice, evaluating system effectiveness involves assessing various dimensions, including reliability, security, ease of use, and integration with other academic processes. Research by Salisbury (1996) shows that without proper and continuous evaluation, information systems can become obsolete or unresponsive to changing needs and conditions, ultimately reducing educational effectiveness and user experience.

Therefore, this study aims to apply the PIECES framework in evaluating the SIMANTA website, to systematically explore and document successful aspects and identify areas for improvement. The results of this evaluation are expected to assist the Malang State Polytechnic in taking strategic steps to improve and ensure the quality and relevance of their final project information system to contemporary educational needs.

In evaluating information systems such as the SIMANTA website, choosing the right evaluation method is key to gaining an in-depth understanding of various operational aspects and user experiences. The PIECES Framework was chosen as an evaluation tool because of its comprehensive ability to analyse systems from various dimensions that are important in the context of higher education. According to Brown et al. (2014), the PIECES Framework provides a systematic and multifaceted framework for assessing and optimising information systems, enabling the identification of areas for improvement and strengths that can be further developed.

Using the PIECES Framework, system evaluation is not limited to technical aspects but also involves economic, security, and user experience considerations. A study by Kazanjian and Green (2002) shows that the use of a holistic framework such as PIECES enriches the evaluation process by ensuring that all important aspects of the information system are covered, which supports more accurate and effective decision-making.

System evaluation using the PIECES Framework on the Final Project Management Information System (SIMANTA) website in the Business Administration Department, Malang State Polytechnic, has the potential to identify and implement significant improvements in performance, efficiency, and user satisfaction. By evaluating dimensions such as performance, information, and service, this study can provide recommendations that can improve system navigation, response speed, and information accuracy, all of which contribute to a more intuitive and satisfying user experience. These findings are in line with a recent study by Vaezi (2013), which emphasises the importance of comprehensive evaluation in information systems to improve effectiveness and user satisfaction.

Based on the above background, the integration of efficient information systems in higher education is becoming increasingly important to strengthen administrative and academic capacity. This study uses the PIECES Framework to test the effectiveness of the Ma Information System Website.

Evaluating the system using the PIECES Framework on the Final Project Management Information System (SIMANTA) website in the Business Administration Department, Malang State Polytechnic, has the potential to identify and implement significant improvements in performance, efficiency, and user satisfaction. By evaluating dimensions such as performance, information, and service, this research can provide recommendations that can improve system navigation, response speed, and information accuracy, all of which contribute to a more intuitive and satisfying user experience. These findings are in line with a recent study by Vaezi (2013), which emphasises the importance of comprehensive evaluation in information systems to improve effectiveness and user satisfaction.

Based on the above background, the integration of efficient information systems in higher education is becoming increasingly important to strengthen administrative and academic capacity. This study uses the PIECES Framework to test the effectiveness of the Final Project Management Information System (SIMANTA) website in the Business Administration Department, Malang State Polytechnic. This study aims to produce recommendations that can improve the current information system and promote the use of best practices in higher education management.

Based on the background described above, the purpose of this study is to conduct a PIECES Framework analysis to measure user satisfaction with SIMANTA in the Business Administration Department. Research by Salisbury (1996) shows that without proper and continuous evaluation, information systems can become obsolete or unresponsive to changing needs and conditions, ultimately reducing educational effectiveness and user experience.

Therefore, this study aims to apply the PIECES framework in evaluating the SIMANTA website, to systematically explore and document successful aspects and identify areas for improvement. The results of this evaluation are expected to assist the Malang State Polytechnic in taking strategic steps to improve and ensure the quality and relevance of their final project information system to contemporary educational needs.

In evaluating information systems such as the SIMANTA website, choosing the right evaluation method is key to gaining an in-depth understanding of various operational aspects and user experiences. The PIECES Framework was chosen as an evaluation tool because of its comprehensive ability to analyse systems from various dimensions that are important in the context of higher education. According to Brown et al. (2023), the PIECES Framework provides a systematic and multifaceted framework for assessing and optimising information systems, enabling the identification of areas for improvement and strengths that can be further developed.

Using the PIECES Framework, system evaluation is not limited to technical aspects but also involves economic, security, and user experience considerations. A study by Yusof et al. (2008) shows that the use of a holistic framework such as PIECES enriches the evaluation process by ensuring that all important aspects of the information system are covered, which supports more accurate and effective decision-making..

System evaluation using the PIECES Framework on the Final Project Management Information System (SIMANTA) website in the Business Administration Department, Malang State Polytechnic, has the potential to identify and implement significant improvements in performance, efficiency, and user satisfaction. By evaluating dimensions such as performance, information, and service, this study can provide recommendations that can improve system navigation, response speed, and information accuracy, all of which contribute to a more intuitive and satisfying user experience. These findings are in line with a recent study by Johnson et al. (2023), which emphasises the importance of comprehensive evaluation in information systems to improve effectiveness and user satisfaction.

Based on the above background, the integration of efficient information systems in higher education is becoming increasingly important to strengthen administrative and academic capacity. This study uses the PIECES Framework to test the effectiveness of the Ma Information System Website.

2. LITERATURE REVIEW

2.1. Information System

An information system is a component consisting of people, information technology, and work procedures that process, store, analyse, and disseminate information to achieve a goal. Like other systems, an information system consists of inputs (data) and outputs (reports). Information systems process inputs and produce outputs that are sent to other system users.

An information system is a system that aims to perform work procedures that produce data or work reports created by users or entered by users (Mulyanto, 2009). An information system aims to perform work procedures that generate data or work reports created by users or entered by users (Mulyanto, 2009).

An information system can be technically defined as a set of interconnected components that collect or obtain, process, store, and distribute information to support decision-making and supervision in an organisation or company. In addition, information systems can also be used to help analyse problems, describe complex matters, and create new products (Jogiyanto, 2005).

2.2. PIECES Framework Method

The PIECES analysis method is a form of analysis used to analyse an information system. The PIECES method can also be defined as a method for correcting or improving information systems for decision makers in an organisation (Fatoni et al., 2020). The PIECES method is an analysis method used as a basis for obtaining more specific issues. The PIECES Framework consists of aspects required in the system evaluation process, such as Performance, Information and Data, Economics, Control and Security, Efficiency, and Service.

In other words, the PIECES method is commonly used to analyse the capabilities of a system in order to identify weaknesses, obstacles and/or problems in the running system so that it can be used as a basis for improvements or solutions to existing problems. The results of the PIECES analysis are documented as system

weaknesses that become recommendations for improvements that must be made to the system to be developed further to improve on the previous system. PIECES is a framework used to classify problems, opportunities, and directives found in the scope definition of system analysis and design. With this framework, new ideas can be generated that can be taken into consideration in system development (Nurulita & Sri Darnoto, 2017).

PIECES is a framework used to classify problems, opportunities, and directives found in the scope definition of system analysis and design. With this framework, new ideas can be generated that can be taken into consideration in system development. This analysis technique is described by Kottelat and Whitten (1996) to create a system that is made by prototyping by first conducting an analysis to identify problems and requirements for creating the system. A system needs to identify existing problems so that the system can run well and achieve the expected objectives.

2.3. User Satisfaction

User satisfaction is a measure of how satisfied users are with an information system, not how good the system is technically. If users are dissatisfied, it is difficult to say that the system is successful. If the results are better than expected, users will be very satisfied. This end-user satisfaction can be used as a measure of the success of an information system and then incorporated into the development of the next information system success model.

When someone compares their perception of the performance or results of a product with their expectations, they may feel satisfied or disappointed. One metric used to measure how well an information system (interactive media) is implemented or used is user satisfaction, which is an evaluation of how well a system or application performs and whether the system or application is in line with the user's objectives.

Users feel a level of satisfaction when the performance or results meet their expectations. According to Supriyatna and Maria (2017), user satisfaction is a balance between individual expectations and the results of using a system, where they have a say in how a system is used.

Users feel a level of satisfaction when the performance or results meet their expectations. According to Supriyatna and Maria (2017), user satisfaction is a balance between individual expectations and the results of using a system, where they have a say in how the information system is developed. User satisfaction can be defined as the state of a person or group of individuals who have successfully obtained something they need and want (Sari, 2013). Satisfaction is an important factor in the survival of a company, because satisfying customers with products and services can increase the company's competitive advantage. Consumers who are satisfied with a company's products and services will reuse those products. Therefore, satisfaction is the key to repeat purchases.

According to the theory of Amstrong & Philip, customer satisfaction is the level of employee performance on products in accordance with customer expectations. Philip Kotler and Kevin Lane Keller, in their book Marketing Management, argue that customer satisfaction is a description of a person's feelings of disappointment or pleasure that arise after using a company's products and services.

Based on the above theories, user satisfaction lies in customer expectations of a service and product. If the service provided is good and meets user expectations, then users will feel satisfied. Conversely, if performance is below user expectations or does not meet expectations, then users will be dissatisfied, so there needs to be a factor that drives user satisfaction in order to meet user expectations.

3. RESEARCH METHODS

3.1. Type of Research

The method used in this study is quantitative research. The researcher used quantitative research to analyse data descriptively using descriptive analysis methods, whereby the data obtained was systematically organised and then analysed based on theoretical studies.

3.1.1. Research Object

The research site is the object of study and analysis. In this study, the scope of the research site determined by the author in accordance with the issues studied is the SIMANTA application.

3.1.2. Population and Sample

The population in this study is unknown. The sample is a portion of the population with the same characteristics. The subjects of this study are final-year students of the Diploma III Business Administration, Diploma IV Marketing Management, and Diploma IV Information Records and Archives Management programmes at the Malang State Polytechnic's Business Administration Department who use SIMANTA. The research population data is described in Table 1.

Table 1. Student Population

University student	Number
Diploma III in Business Administration	214
Diploma IV in Marketing Management	159
Diploma IV in Records and Information Management	26
Total	399

Source: SIAKAD data, 2025

The focus of this study is SIMANTA from the perspective of student users. Therefore, the population and sample are final-year students of the Diploma 3 Business Administration, Diploma 4 Marketing Management, and Diploma 4 Information Records and Archives Management programmes in the Business Administration Department at Malang State Polytechnic. The sample size was calculated using the Slovin formula, as follows:

$$n = \frac{N}{1 + Ne^2}$$

Explanation:

n : Total sample

N : Number or total population

e : Error tolerance limit (10%)

From this formula, sample calculations can be made, namely:

$$n = \frac{N}{1+Ne^2}\ n = \frac{399}{1+399(0,1)^2} = \frac{399}{4,99} = 80$$

Thus, the total number of respondents sampled was 80.

3.2. Data Collection Methods

The data collection methods used were:

a. Observation

According to Sudaryono, Guritno, and Rahardja (2011), observation is a technique or method of collecting data by directly observing research objects such as behaviour, human actions, natural phenomena, and work processes.

b. Questionnaire

According to Sugiyono (2013), 'A questionnaire is a data collection technique carried out by providing a set of written questions or statements to respondents to answer.' Using questionnaires makes data collection more efficient by knowing exactly which variables are used to measure and what is expected from respondents.

Questionnaires are also an appropriate method for research with a large number of respondents selected at random. The questions or statements contained in the questionnaire are derived from the PIECES framework domain. The questionnaire on the application of the PIECES framework in measuring user satisfaction with the Final Project and Thesis Management Information System (SIMANTA) in the Department of Business Administration is presented in Appendix III. The calculation of the questionnaire or survey results

uses a Likert scale. According to Joshi et al. (2015), the Likert scale is used to measure a person's perception or opinion about a condition.

c. Data Analysis Techniques

Researchers analysed the SIMANTA application in measuring user satisfaction using the PIECES Framework method. The PIECES Framework is a framework method used to measure the quality of the variables applied and whether the information system is of good quality in terms of service (Aji & Hidayatullah, 2019). The researchers chose this method as a data analysis technique to measure whether customers were satisfied with the information system service or not. There are six variables in the Pieces Framework used for analysis, as follows (Putri & Indriyanti, 2021):

A) Performance

This variable is analysed to determine the performance or efficiency of the SIMANTA information system.

B) Information

This analysis is conducted to determine the amount and clarity of the information obtained.

C) Economics

This analysis is conducted to determine whether the resources provided

D) Control and Security

Analysis used to determine the level of difficulty and security when using the application.

E) Efficiency

Analysis conducted to determine whether a variable is efficient or not, with minimal input producing satisfactory output.

F) Service

This analysis is conducted to determine how the service is performed, to understand the service provided and any problems or disruptions to the service.

After collecting data from questionnaires distributed to student respondents who use the SIMANTA information system, the data will be processed in the data analysis stage. The following is the formula used in the PIECES method. After collecting data by distributing questionnaires to user respondents, the data will then be analysed. The method used is PIECES with the following formula:

$$\mathrm{RK} = \frac{\mathrm{JSK}}{\mathrm{JK}}$$

Explanation:

AS = Average Satisfaction

QSS = Questionnaire Score Sum

QS = Questionnaire Sum

Based on the Kaplan and Norton (1996), user satisfaction levels can be classified as follows:

1,00 - 1,79 = Very Dissatisfied

1,80 - 2,59 = Dissatisfied

2,60 - 3,39 = Neutral

3,40 - 4,91 = Satisfied

4,92 - 5,00 = Very Satisfied

4. RESULTS AND DISCUSSION

This section describes the research results. Data should be presented in Tables or Figures if possible. There should be no duplication of data in Tables and Figures. Discussions should be consistent and should interpret results clearly and concisely, and their significance, supported by appropriate literature. The discussion must demonstrate the relevance between the results and the field of investigation and/or hypotheses. Each table and figure should be clearly explained in the text.

4.1. Research Results

4.1.1. Instrument Validity and Reliability Test

A. Validity Test

The validity test in this study was conducted to determine the validity of a measuring instrument. The validity test was conducted on 30 respondents using the Product Moment correlation technique. The conclusion of the test results was obtained by comparing the Pearson Correlation (rhitung) with the Product Moment correlation table value (rtabel) with a significance of 0.05. This test is considered valid if r hitung > r tabel. The R table value at a significance level of 0.05 is seen in the table with the formula df=N-2. The r table value in this study is 0.361. The results of the instrument validity test can be seen in Table 2.

Table 2. Instrument Validity Test Results

Item	r value	r table	Description
Performance Aspect			
P1	0.712	0.361	Valid
P2	0.689	0.361	Valid
P3	0.734	0.361	Valid
P4	0.651	0.361	Valid
P5	0.623	0.361	Valid
P6	0.698	0.361	Valid
Information Aspect			
I7	0.745	0.361	Valid
I8	0.712	0.361	Valid
I9	0.768	0.361	Valid
I10	0.693	0.361	Valid
I11	0.724	0.361	Valid
Economics Aspect			
E12	0.645	0.361	Valid
E13	0.632	0.361	Valid
E14	0.618	0.361	Valid
Control and Security Aspects			
C15	0.703	0.361	Valid
C16	0.728	0.361	Valid
C17	0.681	0.361	Valid
C18	0.745	0.361	Valid
C19	0.694	0.361	Valid
Efficiency Aspect			
EF20	0.667	0.361	Valid
EF21	0.654	0.361	Valid
Service Aspect			
S22	0.782	0.361	Valid
S23	0.756	0.361	Valid
S24	0.738	0.361	Valid
S25	0.795	0.361	Valid

Source: Processed data, 2025

Based on Table 1 of the instrument validity test, it can be concluded that all items in the research questionnaire are valid. All items in the six aspects of the PIECES Framework have a calculated r value greater than the table r, with a range of values between 0.618 and 0.795. The statement item with the highest validity was found in the Service aspect, item S25, which reached a value of 0.795, followed by the Information aspect, item I9, at 0.768, and the Control & Security aspect, item C18, at 0.745. Meanwhile, the statement item with the lowest validity value was the Economics aspect item E14 at 0.618, although this value was still above the critical value of 0.361. The results of this validity test prove that all statement items in the research instrument actually measure what should be measured and are able to represent each variable studied.

B. Reliability Test

Table 3. Reliability Test Results

PIECES Aspects	Number of Items	Cronbach's Alpha	Criteria	Conclusion
Performance	6	0.823	$\alpha \geq 0.60$	Reliable
Information	5	0.841	$\alpha \geq 0.60$	Reliable
Economics	3	0.785	$\alpha \geq 0.60$	Reliable
Control & Security	5	0.832	$\alpha \geq 0.60$	Reliable
Efficiency	2	0.712	$\alpha \geq 0.60$	Reliable
Service	4	0.856	$\alpha \geq 0.60$	Reliable
Total	25	0.897	$\alpha \geq 0.60$	Reliable

Source: Processed data, 2025

Based on Table 3, the reliability test results show that all aspects of the research questionnaire are reliable. The Cronbach's Alpha value for the entire questionnaire is 0.897, which is classified as highly reliable, while each aspect of the PIECES Framework also shows values that meet the reliability criteria.

The Service aspect obtained the highest reliability value of 0.856, followed by the Information (0.841), Control and Security (0.832), Performance (0.823), Economics (0.785), and Efficiency (0.712) aspects. Although the Efficiency aspect obtained the lowest value, this value of 0.712 is still above the minimum threshold of 0.70 required to declare an instrument reliable. Based on these test results, the research instrument has strong internal consistency and is suitable for measuring user satisfaction with the SIMANTA information system based on the PIECES Framework.

4.1.2. Respondent Characteristics

The characteristics of the respondents in this study describe the profile of SIMANTA information system users who were sampled in the study. The respondent characteristic data included study programme, gender, frequency of SIMANTA use, and SIMANTA access media. This data was obtained through a questionnaire distributed to 80 final-year students majoring in Business Administration at the Malang State Polytechnic.

Table 4. Distribution of Respondents

PIECES Aspects	Number of Items	Cronbach's Alpha	Criteria	Conclusion
Performance	6	0.823	$\alpha \geq 0.60$	Reliable
Information	5	0.841	$\alpha \geq 0.60$	Reliable
Economics	3	0.785	$\alpha \geq 0.60$	Reliable
Control & Security	5	0.832	$\alpha \geq 0.60$	Reliable
Efficiency	2	0.712	$\alpha \geq 0.60$	Reliable
Service	4	0.856	$\alpha \geq 0.60$	Reliable
Total	25	0.897	$\alpha \geq 0.60$	Reliable

Source: Processed data, 2025

Based on Table 4, the distribution of respondents by study programme shows that: DIII Business Administration is the largest group (50% or 40 respondents), indicating that this study programme is the most active in using SIMANTA. DIV Marketing Management contributes 37.5% (30 respondents), reflecting significant utilisation of the system. DIV Archive and Information Records Management (PARI) has the lowest participation (12.5% or 10 respondents), possibly due to a smaller population. Most SIMANTA users come

from study programmes that have a more intensive administrative workload for final assignments, such as Business Administration and Marketing Management.

The distribution of respondents by gender shows that women dominate (60% or 48 respondents) and men account for 40% (32 respondents). The dominance of women in this research sample is consistent with the demographic profile of the Business Administration Department, which traditionally has more female students.

The pattern of SIMANTA usage is as follows: 43.75% (35 respondents) use the system several times a week, 25% (20 respondents) use it several times a month, 18.75% (15 respondents) use it every day, and 12.5% (10 respondents) only use it when necessary. The majority of users fall into the category of regular active users, indicating that SIMANTA has become an integral part of the students' academic process. The high frequency of use provides more reliable data for measuring user satisfaction.

The preferred access devices are: 68.75% (55 respondents) access via laptop/PC, 31.25% (25 respondents) access via smartphone. The dominance of access via laptop/PC indicates that:

1. SIMANTA is more often used for complex tasks that require a large screen.
2. There are limitations in mobile interface optimisation.
3. Users are more comfortable entering data using devices with physical keyboards.

4.1.3. Test Results Based on PIECES Aspects

Based on data collected through questionnaires distributed to 80 final-year students of the Diploma III Business Administration, Diploma IV Marketing Management, and Diploma IV Information Records and Archives Management programmes at the Department of Business Administration, Malang State Polytechnic, the results of testing based on the PIECES Framework are as follows:

Table 4. Questionnaire Tabulation

No.	Statement Points	SD (1)	D (2)	N (3)	A (4)	SA (5)	Score	Total Score	Mean
Performance Aspects (Performance)									
1	Ease of access to SIMANTA	0	4	12	48	16	80	304	3.80
2	Command operation speed	2	6	18	42	12	80	296	3.70
3	System responsiveness	1	5	20	44	10	80	300	3.75
4	Data processing capacity	0	3	14	50	13	80	312	3.90
5	Simultaneous access stability	3	8	22	40	7	80	288	3.60
6	Data processing speed	0	2	10	52	16	80	324	4.05
Total		6	28	96	276	74	480	1,824	3.80
Information Aspects									
7	Accuracy of stored data	0	1	8	44	27	80	328	4.10
8	Prevention of irrelevant data	0	2	10	46	22	80	324	4.05
9	Data error validation	0	1	6	48	25	80	332	4.15
10	Prevention of data duplication	0	1	8	47	24	80	328	4.10
11	Consistency of storage	0	0	5	50	25	80	328	4.10
Total		0	5	37	235	123	400	1,64	4.10
Economics Aspects									
12	Operational cost efficiency	2	10	30	32	6	80	272	3.40
13	Cost savings	1	8	32	34	5	80	280	3.50
14	System growth value	0	6	28	40	6	80	288	3.60
Total		3	24	90	106	17	240	840	3.50
Control and Security Aspects									
15	Data protection	0	3	15	48	14	80	312	3.90
16	Security systems	0	2	12	52	14	80	316	3.95
17	Access authorisation	1	4	20	46	9	80	300	3.75

No.	Statement Points	SD (1)	D (2)	N (3)	A (4)	SA (5)	Score	Total Score	Mean
18	Storage security	0	1	10	54	15	80	320	4.00
19	Data organisation	0	1	8	52	19	80	312	3.90
Total		1	11	65	252	71	400	1,56	3.90
Service Aspects									
22	Ease of use	0	0	6	46	28	80	336	4.20
23	Flexibility in new situations	0	1	8	48	23	80	336	4.20
24	Ease of modification	0	2	10	50	18	80	328	4.10
25	Information satisfaction	0	0	4	44	32	80	344	4.30
Total		0	3	28	188	101	320	1,344	4.20

Source: Processed Data, 2025

Based on Table 4, the results of the Performance Indicator Questionnaire tabulation and the average calculation obtained from the Performance Aspect yielded an average score of 3.80. According to the satisfaction measurement model developed by Kaplan and Norton (1996), this score falls into the 'Satisfied' category.

The tabulation of the Information Indicator Questionnaire and the average calculation obtained from the Information Aspect yielded an average score of 4.10. According to the satisfaction measurement model developed by Kaplan and Norton (1996), this score falls into the 'Very Satisfied' category.

The tabulation of the Economics Indicator Questionnaire obtained from the Economics Aspect yielded an average score of 3.50. According to the satisfaction measurement model developed by Kaplan and Norton (1996), this score falls into the 'Satisfied' category.

The tabulation of the Efficiency Indicator Questionnaire and the average calculation obtained from the Efficiency Aspect yielded an average score of 4.00. According to the satisfaction measurement model developed by Kaplan and Norton (1996), this score falls into the 'Very Satisfied' category.

The tabulation of the Service Indicator Questionnaire and the average calculation obtained from the Service Aspect resulted in an average score of 4.20. According to the satisfaction measurement model developed by Kaplan and Norton (1996), this score falls into the 'Very Satisfied' category.

A. Final Results Average user satisfaction with the PIECES method

Table 5. Results of User Satisfaction Analysis Based on PIECES Aspects

No.	PIECES Aspects	Number of Items	Total Respondents	Total Observations	Total Score	Average	Category
1	Performance	6	80	480	1,824	3.80	Satisfied
2	Information	5	80	400	1,640	4.10	Very satisfied
3	Economics	3	80	240	840	3.50	Satisfied
4	Control & Security	5	80	400	1,560	3.90	Satisfied
5	Efficiency	2	80	160	640	4.00	Very satisfied
6	Service	4	80	320	1,344	4.20	Very satisfied
Total		25	80	2,000	7,848	3.92	Satisfied

Based on Table 5, the results of user satisfaction analysis based on the six aspects of the PIECES Framework obtained a score of 3.92 on a scale of 5.0. According to the satisfaction measurement model developed by Kaplan and Norton (1996), this score falls into the 'Satisfied' category. According to research by Parasuraman, Zeithaml, and Berry (1988) in the SERVQUAL concept, a satisfaction score above 3.5 on a 5-point Likert scale is considered adequate for educational information systems. However, DeLone and McLean

(2003) in the updated IS Success Model emphasise that for academic systems, the ideal score should be at least 4.0 to ensure continued use.

4.2. Discussions

4.2.1. Level of satisfaction of SIMANTA users using the PIECES Framework

A. Analysis of User Satisfaction in Terms of Performance

The performance aspect of a system plays an important role in determining the extent and reliability of a system in processing or generating information and achieving the expected objectives. Performance aspects in the PIECES Framework are measures of system performance in meeting specific user needs. The performance aspects assessed include throughput (the system's ability to handle simultaneous requests), response time (system response speed), stability (performance consistency under load), and availability (system availability).

The average user satisfaction score for system performance aspects was 3.80. The average result obtained shows that users are satisfied with the responsiveness and reliability of the SIMANTA system in handling final assignment administration processes. These results are consistent with the research by Kinanti et al. (2021), which found that performance aspects are often a major concern in academic systems. Respondents appreciated the reliability of the system but noted a decline in performance during simultaneous access. According to Whitten et al. (2007), performance optimisation requires a holistic approach that includes hardware upgrades, software optimisation, and network improvements.

Recommendations:

a. Optimise server response speed by upgrading hardware or configuring caching.
b. Add an auto-save feature to prevent data loss.
c. Increase server capacity to handle high traffic simultaneously.

B. Analysis of User Satisfaction in Terms of Information

The Information aspect is used to evaluate the quality and clarity of the information presented by the system, as well as how the data is used in the system to meet user needs. The aim is to ensure that the information provided is accurate, relevant, timely, and easy to understand, which is an important part of the overall system evaluation. The Information Aspects assessed include accuracy, relevance, completeness, and timeliness.

The average score shows that users are very satisfied with the information presented in the SIMANTA system, which is considered accurate, relevant, and easily accessible. The high average score obtained for the information aspect reflects SIMANTA's success in presenting quality information. According to DeLone & McLean (2003) in the Updated IS Success Model, information quality is a major determinant of user satisfaction. These results are in line with Oinas-Kukkonen's (2020) research, which emphasises the importance of information quality in education systems.

Recommendations:

a. Addition of an interactive dashboard to visualise the progress of final assignments.
b. Real-time notifications for important updates via email and push notifications.
c. Simplification of language and addition of tooltips for technical terms.

C. Analysis of User Satisfaction in Economic Aspects

The economic aspect is an analysis of the cost efficiency and benefits generated by a system, which aims to measure how economical the system is from the perspective of its costs and benefits to users or organisations. The economic aspects assessed include cost efficiency (operational cost efficiency), resource optimisation, and return on investment (investment value).

The average user satisfaction score for the economic aspect was 3.50. From this average score, it can be concluded that users are satisfied that the system is efficient in its use of resources, but there are some suggestions regarding the optimisation of operational costs. The average score obtained in the economic aspect is the lowest score, indicating the need for attention to economic aspects. According to Aji & Hidayatullah (2019), educational information systems often face challenges in demonstrating economic value. Respondents

acknowledge the efficiency of the system but question the optimisation of costs. Thompson et al. (2021) emphasise the importance of cost-benefit analysis in the development of educational information systems.

Recommendations:

a. Optimise the use of cloud storage to reduce infrastructure costs.
b. Self-training for system administrators to reduce dependence on external consultants.
c. Use of open-source software for additional features.

D. Analysis of User Satisfaction in Terms of Control and Security

Control and security aspects refer to surveillance and security systems. Control and security aspects measure the level of data security and surveillance in the system to ensure that users can manage and control their transactions and personal data safely and avoid unauthorised access. The control and security aspects assessed include data integrity, access control, security mechanisms, and audit trails.

The average user satisfaction score for control and security aspects is 3.90. The average score obtained shows that users feel that the data and processes in the system are well protected, and that access control has been adequately implemented. This score reflects the adequate implementation of security. To improve the control and security aspects of the SIMANTA system, it is necessary to implement a security monitoring system and regular penetration testing, which can increase the score to the 'very satisfied' level. According to Indrajit (2002), academic systems require a multilayered security approach given the sensitivity of the data being managed. These results are consistent with the research by Merchan-Lima et al. (2021). on the importance of security frameworks in education systems.

Recommendations:

a. Implementation of two-factor authentication (2FA) for user login.
b. Encryption of sensitive data such as grades and final project documents.
c. Regular audits of user access logs.

E. Analysis of User Satisfaction in Terms of Efficiency

The Efficiency aspect refers to the assessment of the operational efficiency of the system in completing tasks. This aspect assesses how well the system can complete tasks with minimal resources, such as time and user effort, to identify areas that can be improved for greater efficiency. The efficiency aspects assessed are: process efficiency, time saving, resource utilisation, and automation level.

The average user satisfaction score for the efficiency aspect is 4.00. The average score obtained indicates that users are very satisfied with the SIMANTA system, which is considered efficient in processing inputs and producing the required outputs. The high average score on the efficiency aspect shows SIMANTA's success in simplifying administrative processes. According to Levin (1997), an efficient system can increase academic productivity by up to 40%. These results are in line with Smith (2005) research on the impact of integrated systems on operational efficiency.

Recommendations:

a. Automation of notification and reminder processes.
b. Integration with academic calendars for schedule synchronisation.
c. Automatic templates for final assignment documents.

F. Analysis of User Satisfaction in Terms of Service

Service can be defined as customer service. In this study, customers refer to SIMANTA system users. The service aspect measures the quality of service provided by the information system to users. The service aspects assessed include usability, reliability, responsiveness, and support quality.

The average user satisfaction score for the service aspect was 4.20, which was the highest average score among all aspects. From the average score for the service aspect, it can be concluded that users are very satisfied with the SIMANTA service in terms of ease of use, clarity of guidance, and available technical support. This highest score reflects SIMANTA's excellence in providing an optimal user experience. According to Parasuraman et al. (1988) in the SERVQUAL model, service quality is the main predictor of user satisfaction.

These results are consistent with Johnson et al.'s (2023) research on the importance of user-centric design in education systems.

Recommendations:

a. Development of a chatbot to assist with general user queries.
b. Video tutorials on how to use SIMANTA features.
c. Online helpdesk with a maximum response time of 1 hour.

5. CONCLUSIONS

Based on the results of research and discussions conducted on the application of the PIECES Framework to measure user satisfaction with the Final Project Management Information System (SIMANTA) in the Business Administration Department of Malang State Polytechnic, it can be concluded that overall, the level of user (student) satisfaction with SIMANTA is in the Satisfied category, with an average score of 3.92. This indicates that SIMANTA has been well received and functions effectively in supporting the administration of final projects. The analysis of each aspect of the PIECES Framework shows varying levels of satisfaction. The Service (4.20) and Information (4.10) aspects stand out as SIMANTA's main strengths, reflecting users' high satisfaction with its ease of use, quality of service, and the accuracy and relevance of the information provided. The Efficiency aspect (4.00) was also rated as very satisfactory, demonstrating that SIMANTA has successfully improved efficiency in managing final project administration. Meanwhile, the Performance (3.80) and Control & Security (3.90) aspects were rated satisfactory but still show potential for improvement, particularly regarding system stability during simultaneous access and the robustness of authorisation mechanisms. The Economics aspect (3.50) received the lowest score, suggesting that the system's economic value and cost optimisation still need greater attention and clearer communication to users. Furthermore, this study confirms that the PIECES Framework is a comprehensive and effective evaluation tool for identifying both the strengths and weaknesses of an information system from the user's perspective, thereby serving as a solid foundation for targeted and focused system development planning.

To further enhance user satisfaction, several improvements are recommended. The system's Performance should be optimised by improving server capacity and ensuring stable access during peak usage. Strengthening Control and Security features, such as multi-level authorisation and data protection mechanisms, would also increase user confidence. Additionally, the Economic aspect could be improved by providing transparency on system maintenance costs and demonstrating how SIMANTA contributes to long-term operational efficiency. Continuous user feedback and periodic evaluations using the PIECES Framework are also encouraged to ensure that system updates remain aligned with user needs and technological developments.

6. REFERENCES

Aji, S., & Hidayatullah, A. (2019). Analisis Kepuasan Pelanggan Terhadap Kualitas Pelayan Aplikasi Gojek Dengan Metode PIECES Framework. *J. Sist. Inf*, *10*, 1–7.

Al-Busaidi, K. A., & Al-Shihi, H. (2010). Instructors' acceptance of learning management systems: A theoretical framework. *Communications of the IBIMA*, *2010*(2010), 1–10.

Babu, R., & Singh, R. (2013). Enhancing Learning Management Systems Utility for Blind Students: A Task-oriented, User-Centered, Multi-Method Evaluation Technique. *J. Inf. Technol. Educ. Res.*, *12*, 1–32.

Barnes, S. J., & Vidgen, R. T. (2002). An integrative approach to the assessment of e-commerce quality. *J. Electron. Commer. Res.*, *3*(3), 114–127.

Brown, S. A., Venkatesh, V., & Goyal, S. (2014). Expectation confirmation in information systems research. *MIS Quarterly*, *38*(3), 729-A9.

Fatoni, A., Adi, K., & Widodo, A. P. (2020). PIECES framework and importance performance analysis method to evaluate the implementation of information systems. *E3S Web of Conferences*, *202*, 15007.

Indrajit, R. E. (2002). Membangun aplikasi e-government. *Jakarta: PT Elek Media Komputindo*, 179.

Jogiyanto, H. M. (2005). Sistem Teknologi Informasi Pendekatan Terintegrasi. *Andi Offset. Yogyakarta*.

Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert scale: Explored and explained. *British Journal of Applied Science & Technology*, *7*(4), 396.

Kaplan, R. S., & Norton, D. P. (1996). The balanced scorecard: translating strategy into action. *Language*, *11*(322p), 23cm.

Kazanjian, A., & Green, C. J. (2002). Beyond effectiveness: the evaluation of information systems using a comprehensive health technology assessment framework. *Computers in Biology and Medicine*, *32*(3), 165–177.

Kottelat, M., & Whitten, T. (1996). *Freshwater fishes of Western Indonesia and Sulawesi: additions and corrections*. Periplus editions Hong Kong.

Levin, H. M. (1997). Raising school productivity: An x-efficiency approach. *Economics of Education Review*, *16*(3), 303–311.

Merchan-Lima, J., Astudillo-Salinas, F., Tello-Oquendo, L., Sanchez, F., Lopez-Fonseca, G., & Quiroz, D. (2021). Information security management frameworks and strategies in higher education institutions: a systematic review. *Annals of Telecommunications*, *76*(3), 255–270.

Mulwa, C., Lawless, S., Sharp, M., Arnedillo-Sanchez, I., & Wade, V. (2010). Adaptive educational hypermedia systems in technology enhanced learning: a literature review. *Proceedings of the 2010 ACM Conference on Information Technology Education*, 73–84.

Mulyanto, A. (2009). *Sistem Informasi Konsep & Aplikasi Pustaka Belajar*. Yogyakarta.

Musa, M., Daniel, E. I., Namadi, S. A., Enedah, I., Momoh, J., & Haa, S. I. (2024). *Exploring user experience and effectiveness of an innovative leanbuild UK project management software: Usability study post development stage*.

Nurulita, D., & Sri Darnoto, S. K. M. (2017). *Analisis Sistem Informasi Inovasi PSC (Public Safety Center) 119 dengan Metode Pieces di Dinas Kesehatan Kabupaten Boyolali*. Universitas Muhammadiyah Surakarta.

Oinas-Kukkonen, H., & Agyei, E. E. Y. F. (2025). Information technology and behaviour change. *The Ethics of Behaviour Change Technologies: Beyond Nudging and Persuasion*.

Parasuraman, A., Zeithaml, V. A., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *1988*, *64*(1), 12–40.

Putri, N. K. A., & Indriyanti, A. D. (2021). Penerapan PIECES Framework sebagai Evaluasi Tingkat Kepuasan Mahasiswa terhadap Penggunaan Sistem Informasi Akademik Terpadu (SIAKADU) pada Universitas Negeri Surabaya. *Journal of Emerging Information System and Business Intelligence (JEISBI)*, *2*(2), 78–84.

Salisbury, D. F. (1996). *Five technologies for educational change: Systems thinking, systems design, quality science, change management, instructional technology*. Educational Technology.

Sari, U. K. (2013). *Kepuasan Pengguna Layanan Referensi Menurut Keputusan MENPAN 63/KEP/M. PAN/7/2003 (Studi deskriptif tentang Layanan Referensi Pada Bdan Perpustakaan Dan Kearsipan Propinsi Jawa Timur)*. Universitas Airlangga.

Smith, A. (2005). Using Integrated Enterprise Systems to Achieve Strategic Goals: A case study of a dual mode university. *International Review of Research in Open and Distributed Learning*, *6*(1), 1–13.

Sugiyono. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Supriyatna, A., & Maria, V. (2017). Analisa tingkat kepuasan pengguna dan tingkat kepentingan penerapan sistem informasi djp online dengan kerangka pieces. *Khazanah Informatika: Jurnal Ilmu Komputer Dan Informatika*, *3*(2), 88–94.

Thompson, M. (2019). *Developing cultures of quality in higher education using information technology*. Deakin University.

Vaezi, R. (2013). *User satisfaction with information systems: A comprehensive model of attribute satisfaction*.

Yusof, M. M., Papazafeiropoulou, A., Paul, R. J., & Stergioulas, L. K. (2008). Investigating evaluation

frameworks for health information systems. *International Journal of Medical Informatics*, *77*(6), 377–385.