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Evaluating User Experience of SITASI System using HEART Metrics and Importance-Performance Analysis (IPA)

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Abstract
SITASI is a web-based system developed to help students manage references and citations for their final projects. Despite its importance, no comprehensive evaluation of the system's user experience (UX) had been conducted. This study aims to evaluate the UX of SITASI used by students of the Information Systems Study Programme at UIN Suska Riau. Using a quantitative survey method, data were collected from 72 active students from the 2018-2021 cohorts through an online questionnaire. The evaluation was based on the five HEART Metrics dimensions: Happiness, Engagement, Adoption, Retention, and Task Success. Respondents were selected through random sampling using the Slovin formula. Data were analysed using SPSS version 30 for validity, reliability, and Importance-Performance Analysis (IPA). The HEART results indicated high usability levels across all dimensions, with Happiness and Retention scoring highest (73%) and Engagement lowest (70%). IPA showed an average suitability of 92%, with four indicators placed in Quadrant I, signifying urgent areas for improvement. These results serve as a foundation for actionable recommendations to enhance system satisfaction, improve performance, and develop a more user-centered and adaptive SITASI platform.

Keywords: critical performance analysis; heart metrics; sitasi; user evaluation; user experience

INTRODUCTION

The final project is an important component of the higher education system that serves as proof of students' ability to apply the knowledge and skills they have acquired during their studies (Kristi et al., 2022). This is in line with Law Number 12 of 2012 concerning Higher Education, which states that the final project is a mandatory requirement for graduation for diploma and bachelor's degree students (Ahsyar, 2024). The process of completing a final project involves various complex stages, such as submitting a title, assigning an advisor, preparing a proposal, conducting research, and taking a final exam (Saputra et al., 2024). This lengthy and bureaucratic process requires an efficient, transparent, and easily accessible information system for all parties involved (Aisyah et al., 2023).

As part of efforts to support academic administrative efficiency, the Information Systems Study Program at UIN Suska Riau developed the Final Project Information System (SITASI) starting in the 2019/2020 academic year (Sidabutar & Ichwani, 2024). SITASI was designed as a digital platform to support the entire administrative process of final projects. However, based on interviews with the program head and observations of active users, several issues were identified, such as an unintuitive interface, unresponsive notification systems, and limitations in progress tracking features and integration with other academic systems. These issues could lead to delayed graduation, user confusion, and additional workload for faculty and staff (Hanum et al., 2022).

The development of SITASI features, such as thesis validation, student achievement tracking, and alumni questionnaires, has indeed been carried out as a form of system improvement (Suhaerudin & Alijoyo, 2022). However, this development has focused more on the functional aspects of the system (functionality) and has not been accompanied by a comprehensive evaluation of the user experience (UX) (Syainal et al., 2023). Without a user-centered evaluative approach, it is highly likely that the system will develop technically but fail to meet use to date, no research has specifically evaluated user experience on digital-based thesis information systems at UIN Suska Riau (Syahidi et al., 2021). Additionally, no studies have integrated the HEART and Importance Performance Analysis (IPA) methods simultaneously to evaluate and map UX improvement priorities in this context. Previous research has either applied one method separately or not focused on thesis systems (Ananda et al., 2024). This gap is the primary reason for conducting this research to fill the methodological and contextual void and produce a more comprehensive UX evaluation based on the direct perceptions of system user needs and expectations (Sari et al., 2024).

The HEART framework, developed by Google's UX team, comprises five key metrics Happiness, Engagement, Adoption, Retention, and Task Success that capture emotional, behavioral, and performance aspects of user experience in digital academic systems (Trenggono et al., 2022). Meanwhile, Importance-Performance Analysis (IPA), introduced by Martilla and James, helps identify gaps between the importance and actual performance of system features based on user perceptions (Agyekum et al., 2023; Aghajanzadeh et al., 2022; Cladera, 2021; Falaqi et al., 2023;). This study does not introduce a new evaluation model but integrates HEART and IPA within the Technology Acceptance Model (TAM) framework, which highlights perceived usefulness and ease of use as core factors in technology adoption (Armanda et al., 2023). These factors align closely with HEART dimensions, particularly Adoption, Task Success, and Happiness (Herawati & Suyatno, 2023).

Several prior studies on SITASI have primarily focused on system feature development. Research by Pristantya et al. (2023), developed a mobile application to assist students in managing and monitoring the progress of their final projects. (Josephine et al., 2024) continued by designing an Android version to support user mobility, while (Faisal et al., 2024), introduced web-based validation and achievement features to enhance administrative efficiency. However, these works emphasized technical improvements without a structured evaluation of user experience. To date, no study has systematically assessed SITASI using comprehensive UX frameworks like HEART and IPA. Moreover, there is a lack of quantitative evidence showing how well the system meets user expectations, and no concrete recommendations have been proposed based on user priorities (Adhitya et al., 2024).

This research aims to evaluate the user experience of the SITASI system by integrating the HEART framework and Importance-Performance Analysis (IPA). The primary objective is to develop a comprehensive and structured model for assessing user experience in digital academic systems. Through this approach, the study seeks to identify which features are most valued by users, how well those features perform, and how perceived usefulness and ease of use influence overall acceptance. The findings are expected to contribute scientifically by expanding the methodology for UX evaluation in the academic context. Practically, the results will provide actionable insights for developers and system administrators of SITASI, enabling them to align system functionalities with user expectations, enhance user satisfaction, and ultimately improve the effectiveness and efficiency of academic service delivery at UIN Suska Riau.

METHODS

This study adopts an evaluative quantitative approach using a survey method targeting active SITASI users specifically, students who have used the system during the current semester. The approach focuses on assessing user experience through the HEART indicators (Happiness, Engagement, Adoption, Retention, and Task Success), which are analyzed using Importance-Performance Analysis (IPA). The population consists of students who have used SITASI at least twice in the past month and completed at least one key interaction, excluding faculty members. A purposive sampling technique was used, with a sample size of 72 respondents, determined based on a 95% confidence level and an acceptable margin of error for exploratory research (Yam & Taufik, 2021).

The questionnaire was developed based on Google's HEART framework and adapted to the local context through observations and preliminary interviews, which helped identify contextual issues and refine the indicators. Content validity was ensured through expert review by two UX specialists and an information systems academic. Reliability testing using Cronbach's Alpha yielded a value above 0.7, indicating strong internal consistency. Each HEART indicator is assessed through two items perception (performance) and expectation (importance)mwith their averages used for IPA quadrant mapping. Cut-off points on the IPA matrix are based on the overall mean scores, and HEART values are converted into achievement percentages using a specific formula.

$$\text{Criteria Value} = \frac{N_{total}}{N_{max}} x\ 100\% \tag{1}$$

The intent of Equation 1 is to convert raw HEART metric scores into a standardized percentage format, known as achievement percentage. This equation allows researchers to express user responses as a percentage, making it easier to determine whether the user experience is low, moderate, or high across each HEART dimension. This standardized value also facilitates visual representation and supports further analysis, such as mapping into the Importance-Performance Analysis (IPA) quadrants.

These values facilitate the classification of attributes into the four IPA quadrants: High Priority (high importance, low performance), Maintain (high importance, high performance), Low Priority (low importance, low performance), and Excessive (low importance, high performance). Descriptive statistical analysis is used, with potential subgroup analysis (e.g., by gender or education level) if significant data variability emerges. Ethical approval was obtained from the university's research ethics committee, given the involvement of human participants. This approach captures user perceptions while providing an evaluative mapping to inform strategic, user-focused improvements to the SITASI system.

RESULTS AND DISCUSSION

Results

The user experience (UX) quality of the SITASI system was assessed using Google's HEART Metrics framework, which includes five dimensions: Happiness, Engagement, Adoption, Retention, and Task Success. Together, these dimensions provide a comprehensive overview of user interaction and perceived system effectiveness. The evaluation used a 1–5 Likert scale across 20 indicators. Responses from 72 participants were converted into total scores (Ntotal) for each dimension and compared with the ideal maximum score (Nmax). The resulting percentages indicate the system's usability level from the users' perspective.

Table 1 shows the results of the user experience evaluation of the SITASI system based on five dimensions in the HEART framework. Each dimension has a maximum value (Nmax) of 1440, which is obtained by multiplying the number of respondents by the maximum score on the Likert scale and the number of indicators per dimension. The total score (Ntotal) obtained from the questionnaire indicates that all dimensions achieved a percentage score between 70% and 73%, which falls within the High Usability category. This suggests that, overall, users are sufficiently satisfied and able to use the features in SITASI effectively.

Table 1. Implementation of the heart method

Variable	Nmax	Ntotal	Nkriteria	Category
Happiness	1440	1058	73%	High
Engagement	1440	1016	70%	High
Adoption	1440	1050	72%	High
Retention	1440	1064	73%	High
Task Success	1440	1029	71%	High

However, out of the five dimensions, Engagement recorded the lowest score, at 70%, indicating that user interaction with the system can still be improved for example, through more interactive features or a more attractive interface. Conversely, Retention dimension recorded the highest score at 73%, indicating that users are likely to return to the system within a certain period. Similarly, the Happiness dimension also achieved a score of 73%, suggesting a generally positive emotional response and a high level of user satisfaction when interacting with the SITASI system. Although all dimensions fall within the high usability category, none surpassed the threshold for the very high category (above 80%), indicating the potential for further refinement in enhancing the system's overall user experience.

Table 2. Suitability level calculation

Variable	Code	Performance	Importance	Suitability Level	GAP	High/ Average
Happiness	H1	3.6	4.1	88%	-0,5	A
	H2	3.8	4.3	88%	-0,5	A
	H3	3.6	3.8	95%	-0,2	H
	H4	3.6	4.2	86%	-0,6	A
Engagement	E1	3.5	3.9	90%	-0,4	A
	E2	3.5	3.7	95%	-0,2	H
	E3	3.8	4.1	93%	-0,3	H
	E4	3.4	3.7	92%	-0,3	H
Adoption	A1	3.6	4.0	90%	-0,4	A
	A2	3.5	4.0	87%	-0,5	A
	A3	3.5	4.0	87%	-0,5	A
	A4	3.9	3.8	100%	0,1	H
Retention	R1	3.6	4.1	88%	-0,5	A
	R2	3.7	3.8	97%	-0,1	H
	R3	3.6	3.7	97%	-0,1	H
	R4	3.6	3.8	95%	-0,2	H
Task Success	T1	3.7	4.2	88%	-0,5	A
	T2	3.8	3.9	97%	-0,1	H
	T3	3.5	4.0	87%	-0,5	A
	T4	3.7	4.0	92%	-0,3	H

To obtain a more accurate picture of system improvement priorities, the IPA approach was used. This approach compares the level of importance that users perceive a feature to have with the actual level of performance they experience. Each indicator from the HEART Metrics is then calculated for its suitability based on a comparison of performance scores and importance scores. Indicators with suitability scores below average are considered areas that need improvement, while that above average can be maintained or positioned as additional strengths.

Table 2 presents a comparative analysis of performance and importance scores across the HEART Metrics dimensions using a 1–5 Likert scale. The suitability level was calculated as the percentage ratio of performance to importance, while the GAP value represents the difference between users' expectations and actual system performance. A benchmark of 92% was used to classify each indicator into two categories: High (H) for those at or above the threshold, and Average (A) for those falling below.

Indicators categorized as Average indicating a need for improvement include H1 (user satisfaction), H2 (system appearance), H4 (interaction comfort), A2 (ease of getting started), R1 (sustainability support), T1 (data input), and T3 (information access). These indicators had suitability levels ranging from 86% to 90% with negative GAP values, suggesting that actual system performance does not yet meet user expectations in these areas.

Conversely, high-performing indicators such as A4 (feature accessibility), R3 (consistent usage), and T2 (task completion success) exceeded the benchmark with suitability levels above 94% and minimal or no GAP. These results provide a clear direction for system refinement: prioritizing improvements for underperforming indicators while maintaining the strengths that align with user needs and contribute to a positive overall experience.

Table 3. Hold and action

Variable	Code	Level of Conformance	Hold/Action
Happiness	H1	90%	A
	H2	90%	A
	H3	95%	H
	H4	87%	A
Engagement	E1	93%	H
	E2	95%	H
	E3	94%	H
	E4	93%	H
Adoption	A1	93%	H
	A2	90%	A
	A3	89%	A
	A4	99%	H
Retention	R1	90%	A
	R2	96%	H
	R3	99%	H
	R4	93%	H
Task Success	T1	90%	A
	T2	98%	H
	T3	89%	A
	T4	95%	H

Based on Table 3, out of the 20 indicators evaluated, 8 indicators fall below the 92% conformance threshold, indicating the need for corrective measures (Action). These indicators include H1, H2, H4 (Happiness); A2, A3 (Adoption); R1 (Retention); and T1, T3 (Task Success). The presence of action-required indicators across nearly all HEART dimensions suggests that, despite an overall high level of conformance, several critical aspects still fail to fully meet user expectations. These gaps are primarily related to interface comfort, ease of access, and support for administrative processes.

The other hand, the remaining 12 indicators meet or exceed the 92% threshold and are therefore recommended to be maintained (Hold). The Engagement dimension, in particular, demonstrates strong consistency, with all four of its indicators (E1–E4) classified in the hold category. This suggests that users feel adequately engaged when interacting with the system. Similarly, indicators such as H3, A1, A4, R2, R3, R4, T2, and T4 reflect strong system performance that aligns well with user expectations. These findings provide a more focused picture in determining improvement priorities, while maintaining aspects that are already working optimally. Next, determine the value of the difference test and form a Cartesian diagram using SPSS 30.

The results of the paired sample t-test used to measure the significance of the difference between the importance (user expectations) and performance (actual performance) values of the SITASI system. The test results show that the average difference between the two values is 0.56524, with a p-value < 0.000 for both one-sided and two-sided tests. This very small p-value indicates that the difference between the level of expectations and reality is statistically significant, suggesting that there is a real gap between user expectations and the current system performance. This finding reinforces the urgency of improving the attributes whose performance does not yet align with the level of user importance. To clarify the priorities for system improvements based on importance and performance levels, Figure 1 shows the indicators mapped into four Cartesian quadrants based on IPA analysis.

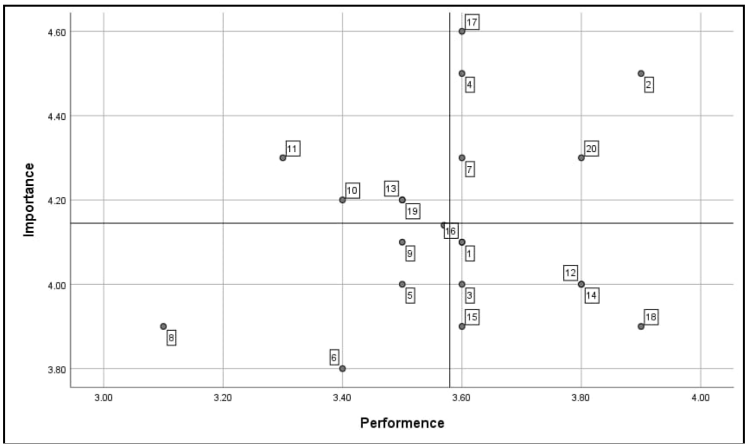

Figure 1. User experience analysis results using a cartesian diagram

Figure 1 shows the results of the analysis of the correlation between the level of importance and the performance of the SITASI system are then mapped into an IPA Cartesian diagram to provide a clearer visualisation of the system development priorities. This diagram divides the evaluation attributes into four quadrants based on two main axes, namely the X-axis (performance) and the Y-axis (importance). With this mapping, system developers can easily identify which indicators need to be improved immediately, which are already performing well and should be maintained, and which can be monitored periodically or maximised as added value. This approach not only facilitates decision-making but also ensures that the system development strategy is truly focused on the aspects that most influence the user experience.

The IPA diagram divides attributes into four quadrants based on their level of importance and performance. These indicators should be prioritized for improvement due to the clear gap between user expectations and actual system functionality. According to the diagram, the indicators in this quadrant include H1 (User Satisfaction), H4 (Interaction Comfort), and T3 (Ease of Accessing Information). In contrast, Quadrant II, namely Keep Up the Good Work, contains attributes with high performance and a high level of importance. Attributes in this quadrant need to be maintained so that they remain optimal and do not decrease in quality. Indicators in this quadrant include E3 (Functionality), T2 (Task Completion Success), and T4 (Error Rate), reflecting critical components of the system that currently perform well and align with user needs.

Meanwhile, Quadrant III or Low Priority shows attributes with low importance and performance. Although the performance is not optimal, this attribute is not a priority for improvement because it is not very impactful according to user perceptions. However, it still needs to be monitored so that it does not decrease further. Finally, Quadrant IV, Possible Overkill, includes attributes that show high performance but are considered less important by users. Attributes in this quadrant are not the main focus of development, but still have the potential to provide added value or uniqueness if developed further.

Table 4. Paired sample test

	Pair	Mean	Significance One-Sided p	Significance Two-Sided p
1	Importance-Performance	0.56524	<0.000	<0.000

The results of the paired sample t-test in table 3 that have been tested further strengthen the results of IPA. This test resulted in a very low significance value ($p < 0.000$), indicating a significant difference between what users expect and what they experience when using SITASI. This GAP shows that although the system has provided benefits, there is still a gap in meeting user expectations, especially in important indicators such as satisfaction, convenience, and ease of access to information. This highlights the importance of developing a data-driven strategy to ensure more targeted system development.

Discussion

The results of the HEART Metrics analysis show that all dimensions evaluated scored between 70% and 73%, which falls into the ‘high usability’ category. This reflects that the SITASI system has generally been able to provide a fairly good experience for its users. The Retention dimension recorded the highest score, with a percentage of 73%, indicating that users tend to repeatedly return to the system. This suggests that the SITASI system has succeeded in maintaining user loyalty and is considered relevant in supporting the completion of final project requirements. On the other hand, the Engagement dimension obtained the lowest score at 70%, which indicates that user interaction and active involvement with the system are not yet fully optimized. This may be attributed to factors such as limited interactive features, static interface design, or a lack of personalized content that resonates with individual user needs.

Although all five dimensions fall into the High usability category (with scores ranging from 70% to 73%), none have reached the Very High category (above 80%). This implies there is still considerable room for enhancement, particularly in improving user engagement. Incorporating more dynamic, responsive, and personalized features may be an effective strategy to foster deeper user involvement and elevate the overall user experience within the SITASI system.

Based on the results of the IPA, it was found that the average level of alignment between users' expectations and reality regarding system features was 92%. This serves as a threshold for identifying attributes that require more attention. Indicators with a match rate below this threshold are categorised as areas for improvement, while those with a match rate equal to or above this threshold are considered to sufficiently meet expectations and can be maintained. By comparing importance and performance levels, IPA provides a visual and strategic overview for determining system development priorities efficiently.

A more in-depth discussion of the GAP values and the level of conformity shows the need for mapping each indicator into priority action quadrants. This approach aims to identify which attributes require immediate improvement, which need to be maintained, and which can be monitored or developed as added value. IPA Cartesian diagrams are used to visualize the position of each indicator based on the level of importance and performance according to user perceptions. This mapping becomes the strategic basis for planning the development of a sustainable SITASI system that is oriented towards the real needs of users.

Based on the IPA mapping, four indicators fall into Quadrant I (Concentrate Here): A3 (Feature Completeness), A4 (Initial Experience), R1 (Usage Consistency), and T3 (Access to Information). These are high-priority areas for improvement. Development should focus on enhancing feature availability, simplifying the onboarding process, improving system consistency, and ensuring easier access to relevant information. Addressing these specific aspects will help bridge the gap between user expectations and the actual performance of the SITASI system.

When compared to previous research by Pristantya et al. (2023), only focused on the development a mobile application to assist students in managing and monitoring the progress of their final projects. Josephine et al. (2024), then adapted the system in the form of an Android application to facilitate the Head of Prodi's access to final project data. Meanwhile (Faisal et al., 2024), added student achievement validation features and alumni questionnaires. However, these three studies have not touched on the aspect of evaluating user experience in depth. Therefore, this research offers novelty through the integration of HEART and IPA methods to evaluate the system as a whole and provide a basis for prioritizing improvements based on data and end-user perceptions.

Additionally, the indicators in Quadrant II (Keep Up the Good Work) include H2 (Ease of Use), H4 (Comfort), E3 (Functionality), T1 (Effectiveness), and T4 (Error Rate). These indicators demonstrate both high importance and high performance, and therefore their quality should be maintained to ensure continued alignment with user expectations. Meanwhile, several indicators fall into Quadrant III (Low Priority), such as E1 (Usage Intensity), E2 (Access Availability), E4 (Usefulness), A1 (Ease of Learning), and R4 (Platform Importance). These indicators are perceived as less important and have moderate performance, but they still require periodic monitoring to avoid future declines. Lastly, Quadrant IV (Possible Overkill) includes indicators with high performance but relatively low perceived importance, such as H1 (User Satisfaction), H3 (Visual Appeal), A4 (Learning Speed), R2 (Service Quality), R3 (Usage Sustainability), and T2 (Communication). Although these are not top priorities for improvement, they may still contribute added value by enhancing the overall appeal and credibility of the SITASI system.

CONCLUSION

This study concludes that the SITASI system demonstrates a high level of usability across all HEART dimensions, with Happiness and Retention receiving the highest scores, and Engagement the lowest. However, the Importance-Performance Analysis (IPA) reveals a notable performance gap, as confirmed by the paired sample t-test ($p < 0.000$). Four key indicators fall into Quadrant I (Concentrate Here) Feature Completeness, Initial Experience, Usage Consistency, and Access to Information highlighting them as top priorities for improvement. Therefore, future development efforts should focus on enhancing these critical areas while maintaining well-performing attributes, in order to better meet user needs and support the efficiency of academic writing.

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