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The Impact of Educational Resource Management on Student Satisfaction: A Quantitative Study of Campus Facilities And Information Techology Systems

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Abstract. This study aims to examine the influence of facility management and information technology systems on student satisfaction using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. The reflective measurement model was assessed to ensure the validity and reliability of the instruments through loading factor, average variance extracted (AVE), and composite reliability tests. The results indicate that all indicators meet the criteria for convergent and discriminant validity and demonstrate high reliability. Evaluation of the structural model reveals that facility management has a significant and substantial effect on student satisfaction, with an f-square value of 1.220 and hypothesis testing results supporting this relationship. In contrast, information technology systems show no significant impact, with an f-square value of 0.003 and hypothesis testing results rejecting the proposed relationship. These findings confirm that facility management is a key factor in enhancing student satisfaction, while information technology systems have yet to make a meaningful contribution in this context.

Key words: Educational Resource Management, Student Satisfaction, Campus Facilities, IT Systems, Higher Education, Quantitative Study

Introduction

Educational resource management serves as a fundamental pillar in supporting the effectiveness of higher education institutions. Amid growing global demands for academic service quality, universities are expected not only to excel in curriculum and instruction but also in the provision and management of campus facilities and information technology systems that support the learning process. According to Almaiah et al. (2020), the success of educational technology implementation largely depends on infrastructure readiness and strategically integrated system management (Almaiah et al, 2020).

Campus facilities such as classrooms, laboratories, libraries, and other supporting amenities play a vital role in creating a conducive learning environment. On the other hand, information technology systems including Learning Management Systems (LMS), academic portals, and other digital services serve as the backbone of technology-based learning. A study by (Al-Fraihat et al., 2020) demonstrates that high-quality IT systems can enhance student engagement and strengthen perceptions of institutional credibility (Al-Fraihat et al, 2020).

Student satisfaction has become a key indicator in evaluating the success of higher education services. Based on the SERVQUAL model developed by Parasuraman et al. (1988) the dimensions of tangibles, reliability, and responsiveness are highly relevant in the context of managing campus facilities and IT systems (Zeithmal, 1988). Research by Abdullah et al. (2018) affirms that students tend to give positive evaluations to institutions that consistently provide optimal and sustainable physical and digital resources (Sharma & Sharma, 2018).

In Indonesia, the digital transformation of the higher education sector has prompted many universities to invest in infrastructure development and academic information systems. However, not all institutions have established systematic evaluation mechanisms to assess the effectiveness of resource management. Sari et al. (2021) reveal that although technology adoption is increasing, its impact on student satisfaction remains underexplored and often described only in general terms (Setyorini & Suliman, 2021).

The effectiveness of managing campus facilities and IT systems affects not only learning comfort but also the overall operational efficiency of the institution. When physical and digital resources are professionally managed, academic processes run more smoothly, service wait times are reduced, and interactions between students and institutions become more productive. Dwivedi et al. (2019) emphasize that digital readiness and infrastructure quality are positively correlated with user satisfaction in the education sector (Dwivedi, 2019).

Although numerous studies have examined the influence of technology on learning, there remains a gap in the literature regarding the quantitative relationship between the effectiveness of resource management and student satisfaction. Most prior research has focused on technical aspects or general perceptions, without testing causal relationships that could inform policy decisions. Therefore, a data-driven approach is needed to identify key variables that contribute to student perceptions.

This study seeks to address that gap by quantitatively examining the impact of campus facility management and IT system effectiveness on student satisfaction in higher education settings. Using appropriate statistical methods, the research aims to provide empirical evidence that can guide policymakers in designing more responsive and student-centered resource management strategies.

Overall, this study is expected to offer theoretical contributions to the development of educational resource evaluation models, as well as practical insights for higher education institutions seeking to improve the quality of academic services. By understanding the relationship between resource management and student satisfaction, institutions can formulate more effective and sustainable policies to meet the challenges of 21st-century education.

Methods

This study employs a quantitative approach with an explanatory design to examine the relationship between the effectiveness of educational resource management comprising campus facilities and information technology systems and student satisfaction levels. This approach was selected for its ability to provide objective empirical insights into the relationships among variables formulated within the conceptual framework. According to Creswell (2014), the quantitative method is well-suited for testing hypotheses and measuring the strength of relationships between constructs through inferential statistical analysis (Ishtiaq, 2019).

The population of this study consists of all active students at STKIP Paris Barantai Kotabaru, a higher education institution located in South Kalimantan that is currently undergoing digital governance and academic infrastructure enhancement. The sample was selected using stratified random sampling to ensure proportional representation across various study programs and academic levels. A total of 200 students participated in the analysis, in accordance with (Li & Lay, 2024). Who recommend a minimum sample size of ten times the number of indicators in the construct with the highest item count in a PLS-SEM model (Hair et al., 2017).

The research instrument is a closed-ended questionnaire based on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire consists of three main sections: (1) indicators of campus facilities management effectiveness, (2) indicators of IT system effectiveness, and (3) indicators of student satisfaction. Each construct was developed based on established theories and prior studies, including SERVQUAL (Zeithmal, 1988) , the Technology Acceptance Model (Davis, 1989), and the educational information system evaluation model proposed by (Al-Fraihat et al, 2020).

Prior to the main analysis, the data were tested for validity and reliability. Construct validity was assessed through convergent and discriminant validity, while reliability was evaluated using composite reliability and Cronbach's alpha. All tests were conducted using the latest version of SmartPLS software, which supports Partial Least Squares Structural Equation Modeling (PLS-SEM). This technique was chosen for its capacity to handle complex models, moderate sample sizes, and data that do not fully meet normal distribution assumptions (Yarsasi et al, 2025).

PLS-SEM was used to test causal relationships between latent variables in the research model. The analysis included outer model evaluation to assess indicator quality for each construct, and inner model testing to examine relationships among constructs. Path coefficients, R^2 values, and effect sizes (f^2) were used to determine the strength and significance of these relationships. Bootstrapping was conducted to obtain t-statistics and p-values as the basis for hypothesis testing.

The research model consists of two independent variables campus facilities management effectiveness and IT system effectiveness and one dependent variable, namely student satisfaction. The model structure was designed based on relevant theories and previous studies, while also considering the local context of STKIP Paris Barantai Kotabaru as a higher education institution transitioning toward a digital campus.

Through this methodological approach, the study aims to provide robust empirical contributions to understanding how educational resource management influences student perceptions and satisfaction. The results of the PLS-SEM analysis not only illustrate the relationships among variables but also serve as a foundation for strategic policy recommendations to help institutions enhance the quality of academic services in a sustainable manner.

Results and Discussion

The Results of the Reflective Construct Measurement Model Test (Outer Model)

The measurement model explains how a construct is measured and ensures that the construct is both valid and reliable. This is achieved by assessing convergent validity, discriminant validity, and construct reliability (Saliya, 2022). The visualization of the outer model in SmartPLS is presented as follows:

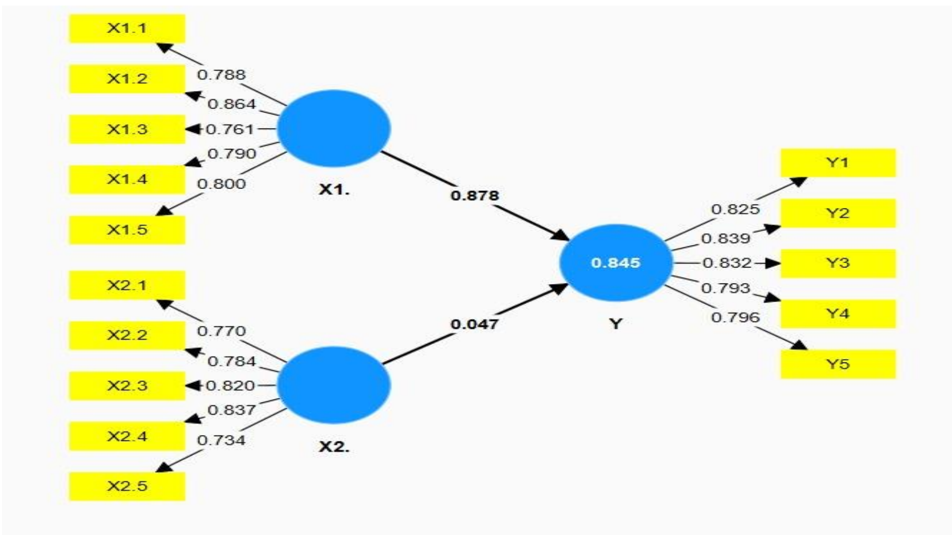

Figure 1. Outer Model

Testing the Validity of Reflective Construct in Research Variables

Validity testing of reflective constructs is conducted by examining the factor loading values for each indicator within the construct. The general rule is that factor loadings should reach 0.7 or higher, and the average variance extracted (AVE) value should exceed 0.5. High factor loadings indicate that the indicators within the construct share significant commonality, thereby representing the same underlying meaning of the construct (Baumgartner & Weijters, 2017).

Table 1. Preliminary Test of Reflective Construct Validity

Variable	Dimension	*Loading factor*	AVE	Description
Y_ Student Satisfaction	Y1	0.825	0.642	valid
	Y2	0.839		valid
	Y3	0.832		valid
	Y4	0.793		valid
	Y5	0.796		valid
X1_ Facilities Management	X1.1	0,788	0.624	valid
	X1.2	0.864		valid
	X1.3	0.761		valid
	X1.4	0.790		valid
	X1.5	0.800		valid
X2_ Information Technology System	X2.1	0.770	0.668	valid
	X2.2	0.784		valid
	X2.3	0.820		valid
	X2.4	0.837		valid
	X2.5	0.734		valid

In Figure 1, the outer model shows that all indicators have outer loading values above 0.70 and also exceed the AVE threshold. Therefore, it can be concluded that all indicators meet the established criteria, and no removal or recalculation is necessary.

Discriminant Validity

Discriminant validity is a method used to ensure that a concept or variable is truly distinct from other concepts or variables based on empirical evidence. In other words, the concept must be unique and represent something different from other concepts within the model. Discriminant validity for reflective variables can be tested by examining the cross-loading values. These values should exceed 0.70 for each variable to be considered valid (Hair et al., 2021). The table presenting the results of discriminant validity is as follows.

Table 2. Cross Loading Values

	Y Student Satisfaction	X1 Facilities Management	X2 Information Technology System
Y1	**0.825**	0.732	0.672
Y2	**0.839**	0.779	0.585
Y3	**0.832**	0.79	0.727
Y4	**0.793**	0.754	0.639
Y5	**0.796**	0.695	0.688
X1.1	0.633	**0.788**	0.644
X1.2	0.873	**0.864**	0.788

	Y Student Satisfaction	**X1 Facilities Management**	**X2 Information Technology System**
X1.3	0.777	**0.761**	0.731
X1.4	0.585	**0.790**	0.623
X1.5	0.751	**0.800**	0.663
X2.1	0.564	0.670	**0.770**
X2.2	0.625	0.672	**0.784**
X2.3	0.650	0.645	**0.820**
X2.4	0.680	0.725	**0.837**
X2.5	0.665	0.713	**0.734**

Based on the table above, it is evident that the correlation of each indicator with its corresponding construct is higher than its correlation with other constructs. Furthermore, the cross-loading values of each indicator meet the recommended standard, which is a minimum of 0.70. Therefore, it can be concluded that the data demonstrates good discriminant validity.

Reliability Test

The reliability test aims to ensure that the instrument used can accurately, precisely, and consistently measure the construct. There are two methods for assessing reliability: Cronbach's Alpha and Composite Reliability. However, Cronbach's Alpha tends to yield lower values, making Composite Reliability the preferred approach (Ghozali & Latan, 2015). For a construct to be considered reliable, its Composite Reliability value must exceed 0.7. A reliable construct is essential as it indicates that the instrument is truly accurate, consistent, and precise in measuring the phenomenon under study. The Composite Reliability results are presented in the table below.

Table 3. Composite Reliability Values

Variable	**Composite Reability**	**Description**
Y Student Satisfaction	0.872	Reliabel
X1 Facilities Management	0.851	Reliabel
X2 Information Technology System	0.877	Reliabel

Based on the data above, it can be seen that all variables have Composite Reliability values greater than 0.7. This indicates that all tested variables—Student Satisfaction (0.872), Facilities Management (0.851), and Information Technology System (0.877)—are considered reliable. This means that the instruments used to measure these variables can be trusted, as they are capable of producing consistent, precise, and accurate results in assessing the phenomenon under study.

Results of Structural Model Testing (Inner Model)

After the measurement model (outer model) demonstrates satisfactory results, the next step in evaluating PLS-SEM is to assess the structural model (inner model). Structural model analysis is conducted to seek evidence supporting the theoretical model, specifically the theoretical relationships between exogenous and endogenous constructs (Putu Gede Subhaktiyasa, 2024).

Nilai R-*Square (Coefficient of determination)*

The R-square value is used to measure the extent to which exogenous variables can explain endogenous variables. In evaluating the structural model, R-square serves as an indicator of the model's predictive strength. According to general guidelines (Hair et al., 2017), R-square values of 0.75, 0.50, and 0.25 indicate strong, moderate, and weak models, respectively. The results of the R-square measurement are presented in the following table.

Table 4. R-Square Values

Variable	R-Square	R-Square Adjusted
X1 Facilities Management		
X2 Information Technology System		
Y Student Satisfaction	0.845	0.834

Based on the analysis in the table, the Student Satisfaction variable (Y) has an R-square value of 0.845. This means that 84.5% of the factors influencing student satisfaction can be explained by the model. It indicates that the model has a strong predictive capability for student satisfaction. After adjusting for model complexity, the adjusted R-square value is 0.702, which still reflects a valid and reliable result.

F-Square Value (F^2 Effect Size)

F-square is used to measure the extent to which the R-square value changes when a construct is removed from the model. Its purpose is to assess whether the construct has a significant influence on the endogenous variable. According to the guidelines by (Haji-Othman et al., 2024). F-square values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively. Meanwhile, an f-square value below 0.02 suggests that the variable does not have a meaningful impact. The results of the f-square calculation are presented in the following table.

Tabel 5. F-Square Values

Variabel	Y Student Satisfaction
X1 Facilities Management	1.220
X2 Information Technology System	0.003
Y Student Satisfaction	

Based on the table above, the Facilities Management variable (X1) has a strong influence on Student Satisfaction (Y), with an f-square value of 1.220. In contrast, the Information Technology System variable (X2) shows a minimal effect on Student Satisfaction (Y), with an f-square value of 0.003, indicating a small impact. These results suggest that Facilities Management is the most influential factor, particularly in relation to student satisfaction, while the other variable has a lesser effect.

Hypothesis Testing Results

The next stage of analysis involves evaluating the significance of the hypothesized relationships between constructs, or analyzing the influence among variables through path coefficients. This process is carried out using the bootstrapping method. The results from the bootstrapping procedure are then used to determine the T-statistic values, which indicate the level of significance of these relationships.

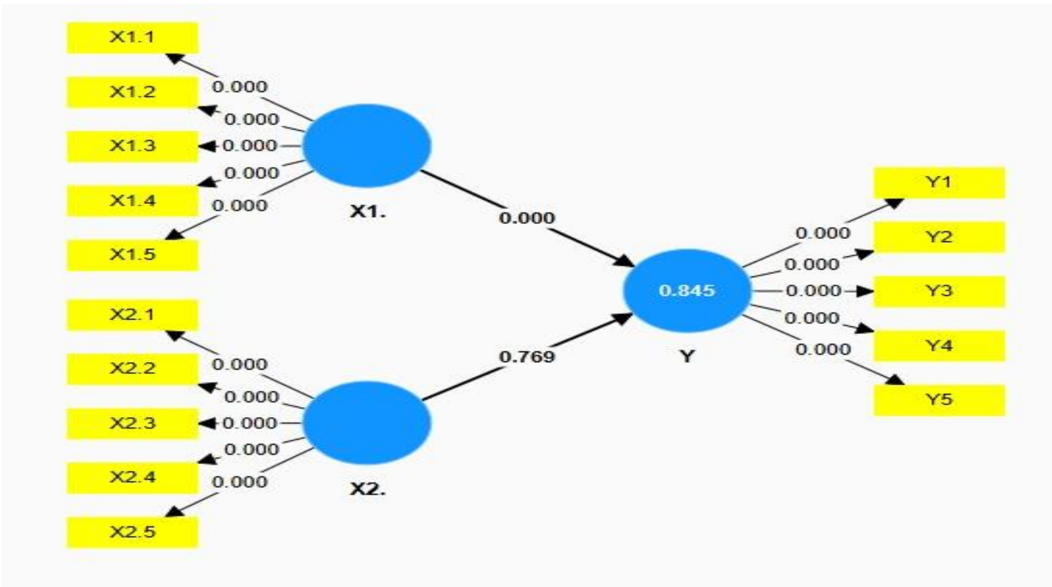

Figure 2. Research Construct Relationship Model Using the Bootstrapping Method

Direct Effect

The hypothesis testing in this study was conducted to determine the partial influence of independent variables on the dependent variable. The test was performed by comparing the calculated t-value with the critical t-table value. If the t-value exceeds 1.96 and the p-value is less than 0.05, the effect is considered significant. Conversely, if the t-value is less than 1.96 and the p-value is greater than 0.05, the effect is deemed insignificant. Based on the Partial Least Square (PLS) model, the relationships between variables can be observed in the following table.

Table 6. Results of Direct Effect Hypothesis Testing

Hypothesis	*Original Sample (O)*	*T-Statistic (|O/STDEV|)*	*P Value*	Description
Facilities Management > Student Satisfaction	0.878	**6.182**	**0.000**	*Diterima*
Information Technology System > Student Satisfaction	0.047	**0.294**	**0.769**	*Ditolak*

Based on the results of hypothesis testing, the following findings were obtained:

1. The relationship between Facilities Management and Student Satisfaction shows a significant result. A T-statistic value of 6.182 (greater than 1.96) and a P-value of 0.000 (less than 0.05) indicate that Facilities Management has a significant influence on Student Satisfaction, thus hypothesis (H1) is accepted.
2. The relationship between the Information Technology System and Student Satisfaction is not significant. With a T-statistic of 0.294 (less than 1.96) and a P-value of 0.769 (greater than 0.05), it shows that the Information Technology System does not have a significant influence on Student Satisfaction, therefore hypothesis (H2) is rejected.

Discussion

Facilities Management in Relation to Student Satisfaction

The empirical findings of this study underscore the pivotal role of facilities management in shaping student satisfaction within higher education institutions (Hermanto et al, 2020). Drawing upon the results of the structural model analysis, it is evident that the construct of Facilities Management (X1) exerts a substantial and statistically significant influence on Student Satisfaction (Y), as demonstrated by a path coefficient of 0.878, a T-statistic of 6.182, and a p-value of 0.000. These values not only surpass the conventional thresholds for significance ($T > 1.96$; $p < 0.05$), but also reflect a robust predictive relationship that warrants deeper theoretical and practical exploration.

From a theoretical standpoint, the strength of this relationship aligns with the service quality framework, particularly the SERVQUAL dimensions, where tangibles—such as physical infrastructure, learning environments, and support facilities—are critical determinants of perceived service quality and satisfaction (Shodikin et al, 2023). The high f-square value of 1.220 further reinforces the magnitude of this effect, indicating that Facilities Management contributes significantly to the variance explained in student satisfaction ($R^2 = 0.845$). This suggests that improvements in the management and availability of campus facilities can lead to meaningful enhancements in students' academic experiences and overall contentment (Chandradara & Suhana, 2025).

The reflective measurement model confirms the validity and reliability of the Facilities Management construct, with all indicators exhibiting factor loadings above 0.70 and an AVE of 0.624. These metrics affirm that the indicators cohesively represent the underlying construct and that the instrument used is both precise and consistent. Moreover, discriminant validity is well established, as each indicator correlates more strongly with its own construct than with others, ensuring conceptual distinctiveness (Sari et al, 2024).

Practically, these findings carry significant implications for institutional policy and strategic planning. Universities must recognize that the physical and operational quality of their facilities—ranging from classrooms, laboratories, libraries, and recreational spaces to maintenance services and accessibility—directly impacts students' perceptions of value and satisfaction. Investments in modernizing infrastructure, ensuring cleanliness and safety, and providing responsive facility services are not merely operational concerns but strategic levers for enhancing student engagement and retention (Abubakar et al, 2025).

Interestingly, the comparative analysis reveals that the Information Technology System (X2) does not exhibit a significant effect on student satisfaction ($T = 0.294$; $p = 0.769$; $f^2 = 0.003$). This contrast highlights the dominant role of tangible, physical resources over digital systems in this particular context (Rizkiyani et al, 2025). While IT systems are undeniably important, their influence may be mediated by other factors such as digital literacy, system usability, or integration with pedagogical practices, which were not the focus of this study.

The data-driven evidence presented herein substantiates the hypothesis that Facilities Management is a critical determinant of student satisfaction. Institutions aiming to elevate their educational quality and student-centered outcomes must prioritize the strategic development and maintenance of campus facilities. Future research may extend this inquiry by exploring longitudinal effects, cross-institutional comparisons, and the interplay between physical and digital infrastructure in shaping holistic student experiences.

The Influence of the Information Technology System on Student Satisfaction

In today's rapidly evolving digital era, the Information Technology System (ITS) has become a vital component in supporting learning processes and academic services within higher education institutions (Yarsasi et al, 2025). However, the findings of this study reveal that the influence of ITS on student satisfaction is not statistically significant. Based on the hypothesis testing results, the path coefficient is 0.047, with a T-statistic of 0.294 (below the threshold of 1.96) and a p-value of 0.769 (above 0.05), indicating that the relationship between ITS and student satisfaction lacks sufficient statistical strength. This is further supported by an extremely low f-square value of 0.003, suggesting that ITS contributes minimally to the variance in student satisfaction.

Theoretically, this finding challenges the common assumption that digitalization automatically enhances user satisfaction (Suriana et al, 2022). In the context of higher education, ITS serves as an enabler—facilitating access to information, streamlining administrative processes, and supporting online learning. However, the effectiveness of ITS in improving student satisfaction depends heavily on the quality of implementation, ease of use, integration with academic needs, and user readiness to engage with the technology.

The validity and reliability of the ITS construct in this study meet academic standards, with all indicator loadings above 0.70 and an AVE value of 0.668 (Santi et al, 2024). The Composite Reliability score is also high at 0.877, indicating that the measurement instrument for ITS is well-designed and consistently captures student perceptions. Nevertheless, despite the technical soundness of the construct, its impact on student satisfaction remains limited.

Several factors may explain this phenomenon. First, students may not yet fully perceive the direct benefits of the available ITS, especially if the system is more focused on administrative functions rather than actively supporting learning. Second, technical issues such as unintuitive interfaces, system disruptions, or lack of user training may hinder optimal utilization. Third, in learning cultures that still prioritize face-to-face interaction, ITS may not be viewed as a primary determinant of learning satisfaction (Wibawa et al, 2024).

The practical implication of this finding is the need for a comprehensive evaluation of the ITS implemented in universities (Azzahra et al, 2025). Institutions must ensure that the systems developed are truly student-centered, accessible, responsive, and well-integrated with academic processes. Moreover, a more participatory approach to ITS development—engaging students as primary users—can enhance the relevance and effectiveness of these systems.

In conclusion, although the Information Technology System is an essential element in the modern educational ecosystem, its influence on student satisfaction cannot be assumed. This finding highlights the importance of a strategic, user-centered approach in designing and implementing ITS within campus environments. Future research is encouraged to explore mediating and moderating factors that may affect the relationship between ITS and student satisfaction, such as digital literacy, perceived ease of use, and technical support.

Conclusion

Based on the findings, future research should explore the mediating and moderating variables that may influence the relationship between information technology systems and student satisfaction, such as digital literacy, user experience, and system accessibility. Practically, universities are encouraged to adopt a user-centered approach in designing and implementing technology platforms, ensuring that systems are not only functional but also aligned with students' academic needs and preferences. Continuous feedback mechanisms and usability testing should be integrated into system development to enhance relevance, engagement, and overall satisfaction.

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