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The Effect of Facilities and Infrastructure Management and Learning Facility Completeness on Student Loyalty with Student Satisfaction as a Mediating Variable

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Abstract

The abstract contains a brief description of the ***Purpose****: This study investigates the effect of facilities and infrastructure management and the completeness of learning facilities on student loyalty, with student satisfaction as a mediating variable based on Expectation Disconfirmation Theory.* ***Methods****: A quantitative explanatory survey was conducted involving 80 students of a private junior high school in Samarinda, Indonesia, selected through purposive sampling. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.* ***Results****: The findings show that facilities and infrastructure management and learning facilities significantly influence student satisfaction, while student satisfaction has a strong effect on student loyalty. The direct effects of facilities and learning facilities on loyalty are not significant, indicating that student satisfaction fully mediates these relationships.* ***Implications****: The study highlights that student loyalty is formed through satisfaction rather than direct facility provision, suggesting that schools should focus on improving students' perceived satisfaction through effective facility management and utilization.*

INTRODUCTION

Education is the fundamental foundation for the development of civilization and the quality of human life, providing essential knowledge and skills to face increasingly complex global challenges (Brutu & Annur, 2023; Ibnu Sholeh, 2020a, 2020b). In the era of the Fourth Industrial Revolution and Society 5.0, the demand for adaptive and high-quality educational institutions is increasing, leading to intense competition, especially among private schools (Wulandari & Prasetyo, 2020; Yuliani, 2022). This phenomenon is a crucial concern, given that private schools are highly dependent on operational sustainability supported by a stable and loyal student body (Aulia & Anisa, 2025; Brutu & Annur, 2023; Lulu et al., 2024).

Table 1. Rollover Numbers for Citra Kasih Junior High School, Samarinda

Jenjang	R 2023/2024			R 2024/2025 (Per 2025-06-30)			R 2025/2026 (Per 2025-07-10)		
	Jumlah Siswa	Rollover	%	Jumlah Siswa	Rollover	%	Jumlah Siswa	Rollover	%
TK-SD	25	25	100,00%	28	27	96,43%	38	33	86,84%
SD-SMP	24	24	100,00%	46	40	86,96%	26	24	92,31%
SMP-SMA	22	16	72,73%	33	26	78,79%	50	36	72,00%
TOTAL	71	65	91,55%	107	93	86,92%	114	93	81,58%

Source : Internal School Data

Based on the above data, in the 2023/2024 academic year, the rollover rate for junior high school and high school reached 72.73%. Although the number of students increased in the

following year, the rollover percentage was only around 78.79% in 2024/2025, and decreased again to 72.00% in 2025/2026. This shows that schools have succeeded in increasing the number of new students each year, but their ability to retain students to continue to senior high school has not increased significantly. Overall, the total rollover for all levels also decreased from 91.55% in 2023/2024 to 86.92% in 2024/2025, and then fell again to 81.58% in 2025/2026.

In the context of competitive rivalry, institutional differentiation can no longer rely solely on curriculum or teacher quality, but must also place aspects of service, learning environment, and facilities and infrastructure management as key competitive advantages (Brutu & Annur, 2023) Adequate and well-managed facilities and infrastructure not only support the learning process, but also directly shape the school's positive image in the eyes of the community, which ultimately becomes a major attraction for prospective new students (Ayu Lestari et al., 2021)

School facilities and infrastructure management is defined as the overall process of planned and conscious efforts to manage physical educational facilities so that they are always ready for use optimally, effectively, and efficiently in order to support the achievement of educational goals (Elfina, 2022; Goffar, 2021; Nurmayuli, 2022).

The ultimate goal of student satisfaction is to build Student Loyalty, which is the students' ongoing commitment to continue choosing and recommending the school as their educational institution (Wulandari & Prasetyo, 2020).

Based on the research gap described above, this study aims to explore and confirm the mechanism of student loyalty formation through an Expectation Disconfirmation Theory (EDT)-based satisfaction approach. Specifically, this study aims to identify the extent to which the management of facilities and infrastructure and the completeness of learning facilities affect student satisfaction, evaluate the contribution of student satisfaction to the formation of loyalty, and verify the mediating role of satisfaction in the influence of both facility variables on student loyalty. Through empirical testing in the context of private junior high schools in Samarinda, this study seeks to answer whether the influence of facilities on loyalty is direct or fully mediated by student satisfaction experiences, as well as to identify which variables have a more dominant contribution in shaping student satisfaction and loyalty.

The novelty of this study lies in its explanation of the mechanism of student loyalty formation through a psychological approach based on satisfaction, rather than through the direct influence of physical school attributes. Unlike previous studies that positioned facilities and infrastructure as direct determinants of loyalty, this study proves that this influence is indirect and fully mediated by student satisfaction. Using the Expectation Disconfirmation Theory (EDT) framework, this study confirms that junior high school student loyalty is formed as a consequence of the fulfillment of students' expectations regarding the quality of facilities and their management.

This study fills five major gaps. First, it fills a theoretical gap by proving the full mediation path of Facilities Management → Satisfaction → Loyalty in the context of secondary education. Second, it fills an empirical gap by focusing on private junior high schools, which have received less attention than higher education or elementary schools. Third, it addresses a methodological gap through the use of PLS-SEM with 5000 bootstrapped subsamples to test mediation robustly. Fourth, it addresses a practical gap by providing policy implications based on student experience, not merely physical investment. Fifth, this study is the first to simultaneously test two mediation pathways (Facilities Management and Facility Completeness on Loyalty through Satisfaction) in the context of private junior high schools based on EDT.

The main theoretical contribution of this study is the confirmation that EDT is relevant to be applied in the context of secondary education. The results show that student loyalty is a psychological construct formed through a cognitive-affective process based on satisfaction, rather than a direct response to the existence of physical facilities. Thus, this study broadens the understanding of student loyalty and provides a conceptual framework that can be used for the development of evidence-based private school management policies (Bahadur, W., Aziz, S., & Zulfiqar, S. 2024)

THEORETICAL FRAMEWORK

1. Expectation Discrepancy Theory (EDT)

Expectation Disconfirmation Theory (EDT), developed by Oliver (1980), is the main theoretical framework for understanding the formation of consumer satisfaction. This theory states that satisfaction is formed through a cognitive-affective process involving a comparison between consumers' initial expectations and their perception of actual performance. When perceived performance exceeds expectations (positive disconfirmation), satisfaction is formed and has the potential to generate loyalty. Conversely, when performance falls below expectations (negative disconfirmation), dissatisfaction arises and can reduce loyalty.

In the context of education, EDT explains that students form expectations about the quality of school facilities and services before experiencing them. After interacting with these facilities, students evaluate the match between their expectations and reality. This process of disconfirmation then shapes students' level of satisfaction, which ultimately influences their decision to remain loyal to the educational institution (Schiebler et al., 2025). The latest meta-analysis research by Schiebler et al. (2025) confirming the validity of EDT in various service contexts, including education, by showing that expectation disconfirmation is a strong predictor of consumer satisfaction.

2. Management of Educational Facilities and Infrastructure

Educational facilities and infrastructure management refers to a series of planned and systematic activities that include planning, procurement, use, maintenance, and disposal of physical school facilities to support effective learning processes (Goffar, 2021; Nurmayuli, 2022). Elfina (2022) emphasizes that good infrastructure management ensures that school facilities are always ready for use, optimal, and efficient in supporting the achievement of educational goals.

Research Ayu Lestari et al. (2021) shows that the quality of infrastructure management not only affects learning effectiveness, but also shapes the school's positive image in the eyes of the community. In the context of private schools operating in a competitive environment, superior infrastructure management is an important differentiator in attracting and retaining students (Brutu & Annur, 2023). However, previous studies have mostly assumed the direct influence of infrastructure on loyalty, without explicitly testing the mediating mechanism through student satisfaction.

3. Completeness of Learning Facilities

The completeness of learning facilities refers to the availability and accessibility of various resources that support the teaching and learning process, including comfortable classrooms, libraries, laboratories, information technology, and other supporting facilities. Tiwari *et al.* (2024) From the perspective of Resource-Based Theory, adequate physical resources are strategic assets that can create sustainable competitive advantage.

In the context of secondary education, the completeness of learning facilities plays a crucial role in supporting students' learning experiences. Clemes *et al.* (2008) found that complete and modern learning facilities contribute significantly to student satisfaction in higher education. However, research at the junior high school level is still limited, particularly in identifying the path of influence of facilities on loyalty through the mediation of satisfaction.

4. Student Satisfaction

Student satisfaction is defined as students' affective and cognitive evaluation of their overall educational experience, which is formed from a comparison between expectations and the actual performance of the educational services received (De Silva *et al.*, 2023). Bahadur et al. (2024) emphasize that student satisfaction is a multidimensional construct influenced by various factors, including teaching quality, facilities, and learning environment.

The research by Alves and Raposo (2007) developed a conceptual model of student satisfaction in higher education which shows that satisfaction is formed from a complex interaction between academic service quality, physical facilities, and social experiences. In the context of junior high school, the early adolescence developmental phase makes students more sensitive to affective experiences than purely rational evaluations (Eccles et al., 1993), making satisfaction an important mediator in the formation of loyalty.

5. Student Loyalty

Student loyalty in the context of education refers to students' ongoing commitment to remain in an educational institution, continue to the next level at the same school, and recommend the school to others (Helgesen & Nesset, 2007). Sultan and Wong (2013) state that institutional loyalty is formed through consistent positive experiences and accumulated satisfaction over time.

Previous studies have shown mixed results regarding the antecedents of student loyalty. Douglas et al. (2006) found that physical facilities directly influence loyalty at UK universities, while Nguyen et al. (2016) identified that the influence of service quality on international student retention is mediated by satisfaction. These differing findings indicate the need for more specific empirical testing in the context of secondary educatio.

6. Relationships Between Variables and Hypothesis Development

Based on the EDT framework and literature review, this study developed seven main hypotheses:

H1: Facilities and Infrastructure Management has a positive effect on Student Loyalty.

H2: Completeness of Learning Facilities has a positive effect on Student Loyalty.

H3: Facilities and Infrastructure Management has a positive effect on Student Satisfaction.

H4: The completeness of learning facilities has a positive effect on student satisfaction.

H5: Student satisfaction has a positive effect on student loyalty.

H6: Student satisfaction mediates the effect of facility and infrastructure management on student loyalty.

H7: Student satisfaction mediates the effect of the completeness of learning facilities on student loyalty.

The conceptual model of the study is described in a framework that integrates exogenous variables (Facilities and Infrastructure Management and Completeness of Facilities), mediator variables (Student Satisfaction), and endogenous variables (Student Loyalty) into a comprehensive causal relationship system.

RESEARCH METHOD

1. Research Types and Approaches

This study uses a quantitative approach with explanatory research. The quantitative approach was chosen because it aims to test hypotheses, explain causal relationships, and measure the influence of independent variables (Management of Learning Facilities and Equipment) on the dependent variable (Student Loyalty) and to explain the process of the mediating variable (Student Satisfaction) objectively and measurably (Podsakoff, P. M et al, 2003). A survey research design using questionnaires was used to collect data from the population sample with the aim of generalizing the findings (De Silva et al, 2023).

The following is a diagram of the conceptual framework for this study:

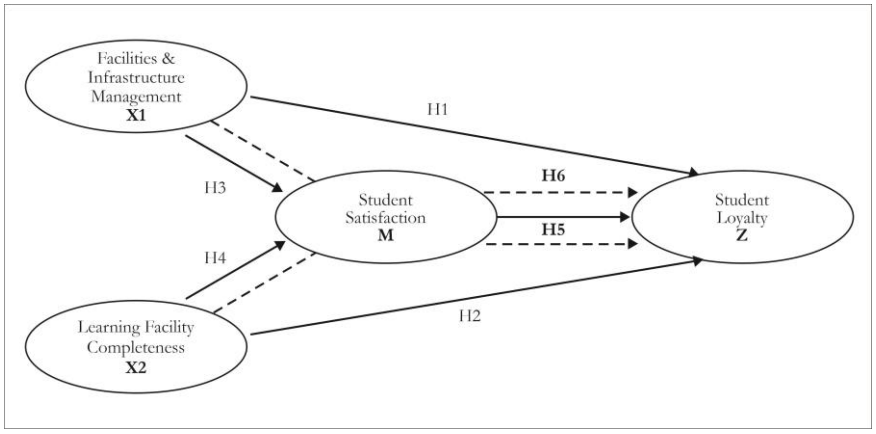

Figure 1. Conceptual Framework

Explanation of the conceptual framework:

H1 : Positive influence of Infrastructure Management on Student Loyalty

H2 : Positive influence of Learning Facility Completeness on Student Loyalty

H3 : Positive influence of Infrastructure Management on Student Satisfaction

H4 : Positive Effect of Learning Facility Completeness on Student Satisfaction

H5 : Positive Effect of Student Satisfaction on Student Loyalty

H6 : Student Satisfaction Mediates the Effect of Facilities and Equipment Management on Student Loyalty

H7 : Student Satisfaction Mediates the Effect of Learning Facility Completeness on Student Loyalty.

2. Location, Time, Population, and Sample

The research location is Citra Kasih Samarinda Junior High School, located at Jl. DI Panjaitan, CitraLand City Housing Complex, Gunung Lingai Village, Sungai Pinang District, Samarinda City, East Kalimantan. This location was chosen for its strategic location, as the private school has been operating since 2012 (the junior high school level opened in 2019) and has unique flagship programs in entrepreneurship and Positive Education, which require high-quality infrastructure management to support its image and competitive advantage. The research was conducted from October to December 2025. The research population consisted of 82 active students at Citra Kasih Samarinda Junior High School (grades 8-9). The reason for selecting 80 students was due to the limited number of students at Citra Kasih Samarinda Junior High School.

The sampling technique used was Purposive Sampling, which involves determining the sample based on specific considerations or criteria relevant to the research objectives.

Referring to the rules developed by Hair, et al. (2013, now updated in Hair et al., 2024), the minimum sample size for PLS-SEM is determined based on the rule of five times (5x) the number of structural paths leading to latent variables or five times the number of indicators in a construct. With a total of 16 indicators and complex structural paths, the sample size was set at 80 respondents, who had to meet the minimum criteria and statistical requirements of PLS-SEM. The criteria for respondents were active students in grades 8 and 9 at Citra Kasih Samarinda Junior High School who had been enrolled for at least six months at the time of the study. This was to ensure that respondents had sufficient experience in assessing and perceiving the quality of school facilities and infrastructure management.

3. Data Collection Method

The main method of data collection was through a survey using a questionnaire. The questionnaire was designed using a Likert scale (e.g., 1 = Strongly Disagree to 5 = Strongly Agree) to measure students' attitudes, perceptions, satisfaction levels, and loyalty toward Sarpras management. The research instrument was designed in the form of a questionnaire using a 1–5 Likert scale, where 1 indicates "Strongly Disagree" and 5 indicates "Strongly Agree." Each variable was measured through a number of statements describing the respondents' perceptions of infrastructure management, facility completeness, student satisfaction, and student loyalty.

Before the data was used to test the hypothesis, the research instrument had to undergo a series of data quality tests, namely Validity Test and Reliability Test. The validity test (e.g., through correlation analysis or factor loading in PLS-SEM) ensures that the instrument measures the concept that should be measured, while the reliability test (e.g., Cronbach's Alpha or Composite Reliability) ensures the consistency of respondents' answers (Hair et al., 2024). Data collection was conducted directly or online to minimize bias and ensure a high responser. The main method of data collection was through a survey using a questionnaire. The questionnaire was designed using a Likert scale (e.g., 1 = Strongly Disagree to 5 = Strongly Agree) to measure students' attitudes, perceptions, satisfaction levels, and loyalty toward Sarpras management. The research instrument was designed in the form of a questionnaire using a 1–5 Likert scale, where 1 indicates "Strongly Disagree" and 5 indicates "Strongly Agree." Each variable was measured through a number of statements describing the respondents' perceptions of infrastructure management, facility completeness, student satisfaction, and student loyalty. Before the data was used to test the hypothesis, the research instrument had to undergo a series of data quality tests, namely Validity Test and Reliability Test. The validity test (e.g., through correlation analysis or factor loading in PLS-SEM) ensures that the instrument measures the co ate from respondents who met the purposive sampling criteria (Priyatno & Aris, 2023).

4. Data Analysis Techniques

Data analysis in this study used the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique, which was operated using SmartPLS version 4.0 software. The selection of the PLS-SEM method was based on three main methodological considerations: first, its ability to handle multivariate non-normally distributed data without requiring strict parametric assumptions; second, its effectiveness in analyzing complex structural models with relatively limited sample sizes; third, its suitability for evaluating mediation paths, which were the main focus of this study.

As a variance-based approach, PLS-SEM places greater emphasis on predicting and explaining phenomena, in line with the explanatory research objectives (Nitzl et al., 2016).

The analysis procedure was carried out through three systematic stages:

First, an evaluation of the measurement model (outer model) was conducted to assess the quality of the research instruments. This stage includes testing convergent validity through factor loading values (≥0.50) and Average Variance Extracted/AVE (≥0.50), testing discriminant validity using Heterotrait-Monotrait Ratio/HTMT (<0.90), and testing internal reliability through Composite Reliability and Cronbach's Alpha (≥0.70) (Hu & Bentler, 1999).

Second, evaluation of the structural model (inner model) is carried out to test the research hypotheses (H1, H2, H3, H4, H5). This stage involved analyzing path coefficients to determine the direction and strength of the relationships between variables, testing R-square values to measure the variance explained by exogenous variables, and evaluating effect sizes (f^2) to assess the substantive influence of each variable (Sarstedt et al., 2022).

Third, mediation hypothesis testing (H6, H7) was conducted using the bias-corrected percentile bootstrapping procedure with 5,000 subsamples at a 95% confidence level to evaluate the significance of specific indirect effects. The bootstrapping method was chosen because of its ability to produce estimates that are robust to violations of normality assumptions and provide accurate confidence intervals for mediation effects (Streukens et al., 2016). Mediation testing was conducted by analyzing the indirect paths of Facilities Management → Satisfaction → Loyalty and Facility Completeness → Satisfaction → Loyalty, and comparing them with direct effects to determine the type of mediation (full or partial).

RESEARCH RESULT

Based on the sample results obtained, this study was processed using SEM PLS and SmartPLS 4 measurement tools with quantitative methods to measure and determine the validity and reliability of the data obtained.

1. Measurement Model Test (Outer Model)
   a. Convergent Validity Test – Average Variance Extracted (AVE)

Table 2. Convergent Validity Test Result

Variables	Average Variance Extracted (AVE)
M - Student Satisfaction	0,596
X1 - Infrastructure Management	0,503
X2 - Facility Completeness	0,510
Y - Student Loyalty	0,632

Source : Procesed by the author (2025)

The results of convergent validity testing using Average Variance Extracted (AVE) values show that all constructs in the research model have met the criteria required in SEM-PLS analysis. The AVE values for each construct are 0.596 for M, 0.503 for X1, 0.510 for X2, and 0.632 for Y, all of which are above the minimum threshold of 0.50.

   b. Discriminant Validity Test – Heterotrait Monotrait Ratio (HTMT) Confidence Interval

Table 3. Discriminant Validity Test Result

	Original sample (O)
X1 - Infrastructure Management <-> M-Student Satisfaction	0.861
X2 - Facility Completeness <-> M-Student Satisfaction	0.873
X2 - Facility Completeness <-> X1 - Infrastructure Management	0.883
Y-Student Loyalty <-> M-Student Satisfaction	0.847
Y-Student Loyalty <-> X1 - Facilities Management	0.676
Y-Student Loyalty <-> X2 - Facility Completeness	0.749

Source : Procesed by the author (2025)

Based on the discriminant validity test using the Heterotrait–Monotrait Ratio (HTMT), all HTMT values were below the 0.90 limit, so it can be concluded that the research model has met the criteria for discriminant validity. Thus, the model is feasible to proceed to the Structural Test.

c. Composite Reliability Test & Cronbach Alpha

Table 4. Composite Reliability Test Result

Variables	Reliabilitas Komposit (rho_a)	Cronbach Alpha	Description
M-Student Satisfaction	0.939	0.938	Reliable
X1 - Infrastructure & Facilities Management	0.949	0.948	Reliable
X2 - Facility Completeness	0.951	0.949	Reliable
Y-Student Loyalty	0.963	0.961	Reliable

Source : Procesed by the author (2025)

The reliability test produced Composite Reliability and Cronbach's Alpha values ranging from 0.938 to 0.963, confirming very high internal consistency across all constructs and meeting the required reliability criteria.

Outer Loading

Convergent validity testing was also conducted by evaluating the outer loading values for each indicator. Based on the outer loading value criterion of ≥ 0.50, which is the minimum standard in exploratory research, all indicators in this study were declared valid. Most indicators even had loading factor values above 0.70, which is the ideal standard in confirmatory research.

High outer loading values indicate that each indicator has a strong contribution to the latent construct being measured. Indicators with high loading factor values reflect a good ability to explain latent variables and indicate a strong relationship between the indicator and its construct. These findings confirm that the selection of indicators in the study was appropriate and able to represent the theoretical concepts that formed the basis for measuring the research variables.

2. Structural Model Testing (Inner Model)

a. R-Square Test

Table 5. R-Square Test Result

Variables	R square	R Square Adjusted
M-Student Satisfaction	0.734	0.728
Y-Student Loyalty	0.670	0.657

Source : Procesed by the author (2025)

The R^2 value for Student Satisfaction is 0.734 and Student Loyalty is 0.670, indicating that the model has moderate to substantial predictive power. These results show that 73.4% of the variance in satisfaction and 67.0% of the variance in loyalty can be explained by the exogenous variables in the model.

b. F-square Test

Table 6. F-Square Test Result

Variables	F square
M-Student Satisfaction -> Y-Student Loyalty	0.423
X1 – Facilities & Infrastructure Management -> M-Student Satisfaction	0.183
X1 - Facilities & Infrastructure Management -> Y-Student Loyalty	0.014
X2 - Facility Completeness -> M-Student Satisfaction	0.262
X2 - Facility Completeness -> Y-Student Loyalty	0.041

Source : Procesed by the author (2025)

The effect size evaluation shows that Student Satisfaction has a significant effect on Loyalty (f^2 = 0.423), while Infrastructure Management (f^2 = 0.183) and Facility Completeness (f^2 = 0.262) have a moderate effect on Satisfaction. The direct effects of both on Loyalty are small (f^2 = 0.014 and 0.041), confirming the dominant role of Satisfaction as a mediator (Cohen, 1988).

c. Predictive Relevance Test (Q^2) and Model Fit

Tabel 7. Q-Square Test Result

Variables	**Q^2 (Predict)**	**Interpretation**
M-Student Satisfaction	0,421	Strong predictive relevance
Y-Student Loyalty	0,389	Strong predictive relevance

	Nilai	**Cut-off**	**Description**
SRMR	0,068	< 0,08	Good fit model

Source : Procesed by the author (2025)

The predictive relevance evaluation shows that Q^2 Student Satisfaction = 0.421 and Student Loyalty = 0.389 (both >0, substantial category according to Hair et al (2024), confirming the model's strong predictive ability. The model fit assessment results in SRMR = 0.068 (<0.08), indicating a good fit with empirical data.

d. Hypothesis Testing

Tabel 8. Hypothesis Testing Result

Variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Description
M-Student Satisfaction -> Y-Student Loyalty	0.725	0.728	0.154	4.715	0.000	Significant
X1 - Infrastructure Management -> M-Student Satisfaction	0.407	0.410	0.158	2.571	0.010	Significant
X1 - Facility Management -> Y-Student Loyalty	-0.138	-0.118	0.131	1.051	0.293	Not Significant
X2 - Facility Completeness -> M-Student Satisfaction	0.487	0.488	0.171	2.847	0.004	Significant
X2 - Facility Completeness -> Y-Student Loyalty	0.239	0.223	0.166	1.444	0.149	Not Significant

Source : Procesed by the author (2025)

H1: (X1) Infrastructure Management – (Y) Student Loyalty

Facilities management has a negative but insignificant effect on student loyalty (β = −0.138; T = 1.051; p = 0.293), so H1 is **rejected**. This shows that there is no direct effect of X1 on Y and indicates the mediating role of student satisfaction.

H2: (X2) Completeness of Learning Facilities – (Y) Student Loyalty

The completeness of learning facilities has a positive but insignificant effect on student loyalty (β = 0.239; T = 1.444; p = 0.149), so H2 is **rejected**. The effect of X2 on Y occurs indirectly through student satisfaction.

H3: (X1) Infrastructure Management – (M) Student Satisfaction

Infrastructure management has a positive and significant effect on student satisfaction (β = 0.407; T = 2.571; p = 0.010), so H3 is **accepted**. This shows that X1 is an effective predictor in increasing student satisfaction.

H4: (X2) Completeness of Learning Facilities – (M) Student Satisfaction

The completeness of learning facilities has a positive and significant effect on student satisfaction with a stronger effect than X1 (β = 0.487; T = 2.847; p = 0.004), so H4 is **accepted**.

H5: (M) Student Satisfaction – (Y) Student Loyalty

Student satisfaction has a positive and highly significant effect on student loyalty (β = 0.725; T = 4.715; p = 0.000), thus H5 is **accepted**. This finding confirms student satisfaction as the main determinant of loyalty.

3. Mediation Effect Test (Specific Indirect Effect)

Table 9. Mediating Effects Test Result

Variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1 - Infrastructure Management -> M-Student Satisfaction -> Y-Student Loyalty	0.295	0.292	0.119	2.483	0.013
X2 - Facility Completeness -> M-Student Satisfaction -> Y-Student Loyalty	0.353	0.362	0.168	2.103	0.036

Source : Procesed by the author (2025)

Hypothesis 6: The indirect effect of X1 on Y through M (mediation)
Mediation analysis shows that the indirect effect of X1 on Y through M is significant (β=0.295; p=0.013), confirming that student satisfaction fully mediates the relationship between facility management and student loyalty (H6 accepted).

Hypothesis 7: Indirect Effect of X2 on Y through M (Mediation)
The indirect effect of X2 on Y through M is significant and stronger than that of X1 (β=0.353; p=0.036), confirming student satisfaction as a full mediator in the relationship between facility completeness and loyalty (H7 accepted).

Overall, the specific indirect effect results confirm that student satisfaction acts as a **full mediator** in the facility-loyalty relationship. Although the direct effects of X1 and X2 on loyalty are not significant (H1 and H2 rejected), the indirect effects through satisfaction are highly significant (H6 and H7 accepted), with X2 showing a stronger mediation path (β=0.353) than X1 (β=0.295).

4. Summary of Hypothesis Testing Results

Out of the seven hypotheses tested, five were accepted and two were rejected. The accepted hypotheses include H3, H4, H5, H6, and H7, while the rejected hypotheses are H1 and H2.

The findings of this study reinforce the Expectation Disconfirmation Theory (EDT), which asserts that loyalty is formed through a cognitive-affective evaluation process of the conformity between expectations and actual service performance (Oliver, 1980). In the context of education, student loyalty is not formed directly from the quality of facilities, but rather through student satisfaction as a mediating mechanism. Empirically, the results of this study are in line with Helgesen and Nesset (2007), Alves and Raposo (2007), and Sultan and Wong (2013), who emphasize that satisfaction acts as the main mediator between service quality and institutional loyalty. These findings are also consistent with Clemes et al. (2008) and Nguyen et al. (2016), who show that the influence of facilities on loyalty is indirect and mediated by a satisfying learning experience.

Conversely, the differences in results with the studies by Sultan and Wong (2010) and Douglas et al. (2006) are thought to be influenced by differences in education levels. At the junior high school level, students are in the early adolescence phase, which is more

influenced by affective experiences than rational evaluations of the physical attributes of the school (Eccles et al., 1993).

Methodologically, these findings support Hair et al.'s (2019) recommendation regarding the importance of testing mediation paths in SEM-PLS to avoid causal bias. Thus, this study expands the application of EDT in the context of secondary education and confirms that student satisfaction is a key mechanism in the formation of loyalty, with practical implications for managing learning experiences, not just investing in physical facilities.

DISCUSSION

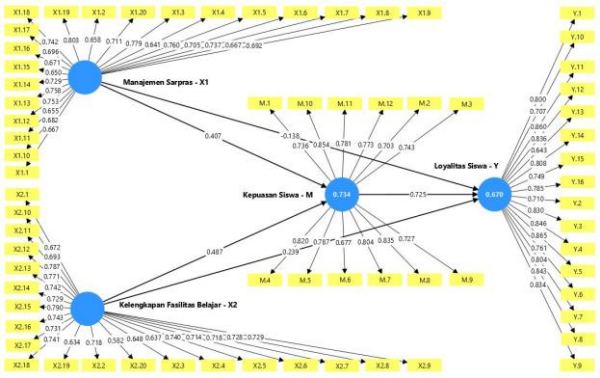

Figure 2. Research Structural Model (PLS-SEM Test Results)

The model shows that facility and infrastructure management (X1) and learning facility completeness (X2) have a positive effect on student satisfaction (M), with X2 having a greater effect than X1. Conversely, X1 does not have a significant direct effect on student loyalty (Y), while X2 has a small direct effect. Student satisfaction (M) has a strong and significant effect on student loyalty, so that satisfaction acts as the main mediating variable. The R^2 value shows that the model is able to explain 73.4% of the variation in student satisfaction and 67.0% of the variation in student loyalty.

Hypothesis Explanation:

H1. Facility and infrastructure management does not have a significant effect on student loyalty, indicating that facility management is not yet capable of directly shaping loyalty.

H2. The completeness of learning facilities does not have a significant effect on student loyalty, meaning that physical factors are not sufficient to be the main determinant of loyalty.

H3. Facility and infrastructure management has a positive effect on student satisfaction, emphasizing the importance of quality facility management in enhancing the learning experience.

H4. The completeness of learning facilities has a positive and significant effect on student satisfaction and is a more dominant factor than facility and infrastructure management.

H5. Student satisfaction has a significant effect on student loyalty, making satisfaction the main determinant of loyalty formation.

H6. Student satisfaction fully mediates the effect of facility and infrastructure management on student loyalty.

H7. Student satisfaction also fully mediates the effect of learning facility completeness on student loyalty.

CONCLUSION

This study successfully confirmed the psychological mechanism of junior high school student loyalty formation through the Expectation Disconfirmation Theory approach. The main findings show that student satisfaction functions as a full mediator in the relationship between infrastructure management and learning facility completeness on student loyalty. The direct effect of facilities on loyalty is not significant (H1 and H2 rejected), but the indirect effect through satisfaction is very significant (H6 and H7 accepted), confirming that loyalty is formed through a process of satisfaction evaluation, not solely from the physical existence of facilities.

Both predictors of infrastructure management and facility completeness have a significant effect on student satisfaction (H3 and H4 accepted), with facility completeness showing a stronger effect than infrastructure management. Student satisfaction has a dominant effect on loyalty with the highest coefficient (H5 accepted), confirming its position as a key variable in the educational loyalty ecosystem.

The research model demonstrates good measurement quality with acceptable composite reliability and adequate convergent validity. The structural model has moderate explanatory power and good predictive relevance, with an acceptable model fit.

The theoretical contribution of this study is to confirm the applicability of EDT in the context of secondary education and to prove that satisfaction is a necessary and sufficient mechanism for transforming perceptions of facility quality into loyal behavior. The practical contribution is to provide an evidence-based framework for strategies to increase rollover rates among private junior high school students by focusing on student satisfaction management, rather than merely investing in physical infrastructure.

RESEARCH LIMITATIONS

This study has three main limitations that need to be considered:

1. Generalization of findings is limited because the sample comes from one private school (n=80) with specific characteristics. The findings are more accurately interpreted as context-specific insights rather than universal principles.
2. There is a risk of common method bias due to the use of self-reported data from a single source at a single point in time. Although procedural remedies were implemented, statistical remedies such as the marker variable technique were not applied.
3. The cross-sectional design cannot capture the temporal dynamics in the process of expectation disconfirmation and satisfaction formation. Lagged effects and cumulative effects may not be captured.

RESEARCH RECOMMENDATIONS AND IMPLICATION

Research Implication

This study provides important theoretical implications for the development of educational management studies, particularly in understanding the mechanisms of student loyalty formation in private junior high schools. The findings show that the management of facilities and infrastructure and the completeness of learning facilities do not directly affect student loyalty but indirectly affect it through student satisfaction as a full mediating variable. These results reinforce the Expectation Disconfirmation Theory (EDT), which states that satisfaction arises as a result of a comparison between expectations and perceived performance, and that satisfaction forms the basis for loyal behavior. Thus, this study confirms that the existence and management of school facilities and infrastructure will only have an impact on student loyalty if they are able to create satisfaction that is subjectively felt by students.

Conceptually, this study fills a gap in previous research by proving that student satisfaction plays a central role as a psychological mechanism that bridges the influence of school operational factors on student loyalty. These findings also show that the completeness of learning facilities has a stronger influence on student satisfaction than the management of facilities and infrastructure, thereby enriching our understanding of the hierarchy of variable influences in the context of secondary education. In addition, this study makes a methodological contribution through the use of PLS-SEM in testing the full mediation model in the context of private junior high schools, which is still relatively limited in educational research in Indonesia.

From a practical perspective, the results of this study provide strategic implications for school administrators in designing policies to increase student loyalty. The findings show that student satisfaction is the most dominant factor in shaping loyalty, so schools need to shift their management focus from merely providing facilities and infrastructure to how these facilities and infrastructure are utilized and perceived by students. The management of facilities and infrastructure should be directed at improving comfort, ease of access, and the overall quality of the student learning experience.

In addition, the results of the study indicate that the completeness of learning facilities has a greater contribution to increasing student satisfaction. Therefore, schools need to prioritize the provision of learning facilities that are relevant to student needs, such as comfortable classrooms, technology-based learning support facilities, and facilities to support academic and non-academic activities. Optimizing these facilities is expected to increase student satisfaction, which will ultimately have an impact on increasing loyalty and the tendency of students to continue their education at the same school at the next level.

Another practical implication is the importance of continuous evaluation of student satisfaction. Schools are advised to measure student satisfaction periodically through internal surveys or systematic feedback mechanisms. The information obtained from these evaluations can be used as a basis for strategic decision-making in the management of educational resources, facilities, and services, enabling schools to maintain their competitive advantage and improve institutional sustainability.

Research Recommendation

Based on the results of the study, school management is advised to make student satisfaction the main indicator in the management of facilities and infrastructure and the development of learning facilities. Decision-making related to facility investment should not only consider physical feasibility but also take into account students' perceptions and learning experiences. In addition, school management needs to integrate the results of student satisfaction evaluations into school strategic planning so that efforts to increase student loyalty can be carried out in a targeted and sustainable manner.

For future research, it is recommended to conduct a multi-site comparative study with replication involving 5-10 private junior high schools with different characteristics (urban vs. rural, high-fee vs. medium-fee, different flagship programs) to increase external validity and explore contextual moderators. Future research could also add other variables that may influence student loyalty, such as academic service quality, school image, parental involvement, or the quality of teacher-student relationships. Furthermore, the use of a longitudinal research design and the expansion of the research object to different education levels or regions are expected to increase the generalizability and depth of the research findings.

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