

The influence of efficiency and effectiveness in the utilization of school operational assistance funds on the quality of teaching and learning services: A Case study at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura

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Article History

Received on 27 April 2025

1st Revised on 5 May 2025

Accepted on 10 May 2025

Abstract

Purpose: This study examines the influence of efficiency and effectiveness in the use of School Operational Assistance (BOS) funds on the quality of teaching and learning services in Indonesia. This research focuses on two junior high schools in Papua—SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura—which represent different demographic and resource contexts.

Research/methodology: A mixed-method approach was applied, combining surveys, interviews, observations and document analysis. Quantitative data were tested using multiple linear regression, and qualitative insights were analyzed through content analysis.

Results: Findings show that both efficiency ($B = 0.670$, $p < 0.001$) and effectiveness ($B = 0.553$, $p < 0.001$) in BOS fund utilization significantly improve the quality of teaching and learning. SMP Negeri 12 Mimika demonstrated higher efficiency, effectiveness, and overall service quality than SMP Negeri Naena Muktipura. BOS funds were used to enhance facilities, provide teaching aids, and support teacher training, although equitable access to training remained limited.

Conclusions: Efficiency and effectiveness in BOS fund use are crucial for improving service quality, with efficient management exerting a stronger influence on facilities, teacher training, and learning tools. Transparent and well-targeted fund allocation is vital for improving educational outcomes.

Limitations: This study was limited to two schools in Papua, potentially reducing its generalizability. Context-specific qualitative findings and time constraints also limited the perspectives of broader stakeholders.

Contribution: This study adds to the educational finance and policy literature by showing how efficient and effective fund management enhances education quality in under-resourced settings, offering guidance for BOS policy improvements and school-level practices.

Keywords: *Efficiency, Effectiveness, Fund Management, Quality of Teaching and Learning Services, School Operational Assistance (BOS) Funds*

How to Cite: Agustin, F. D., Iek, M., & Hafizriandra, Y. (2025). The influence of efficiency and effectiveness in the utilization of school operational assistance funds on the quality of teaching and learning services: A Case study at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. *Journal of Multidisciplinary Academic and Practice Studies*, 3(2), 111-125.

1. Introduction

Education is a key sector in a country's development. In Indonesia, education is expected to produce high-quality human resources capable of addressing various global challenges and improving societal welfare (Saepudin, Marselina, Wahyudi, & Ciptawaty, 2023). One of the Indonesian government's efforts to enhance the quality of education across both urban and rural areas is the School Operational Assistance (BOS) program (Putra, Gistituati, & Rusdinal, 2023). This initiative aims to support schools in meeting their operational needs to improve educational quality without imposing a financial burden on communities, particularly in terms of education costs (Ass, Mustafa, Juana, Nur, & Hadi, 2024).

BOS funds are provided to schools across Indonesia to support various operational activities related to the learning process, such as the provision of teaching materials, the purchase of educational tools and equipment, and the improvement of facilities and infrastructure that support teaching and learning activities (Soro, Rifandi, Sofayantina, & Listianti, 2024). In practice, proper allocation and efficient and effective management of BOS funds are expected to enhance the quality of educational services, particularly within classroom learning processes (Meidianto & Wisnuwardhana, 2024). However, despite the substantial amount of BOS funding distributed, questions remain regarding the extent to which these funds contribute to improving the quality of teaching and learning services in schools, especially at the junior high school level (Yusmaridi, Sunarti, Rusdinal, Gistituati, & Juita, 2021). Many schools continue to face challenges in managing BOS funds efficiently and effectively, which may limit the funds' potential positive impact on learning quality. Several influencing factors include inadequate understanding of financial management, misallocation of funds, and external issues such as limited training and support from relevant stakeholders (Hidayat, Burhan, & Ma'ruf, 2019).

SMP Negeri 12 Mimika, one of the schools located in Mimika Regency, Central Papua, also receives BOS funding to improve the quality of education. The researcher selected SMP Negeri 12 Mimika as the object of this study because both schools—SMP Negeri 12 Mimika and SMP Naena Muktipura—have similar student populations of approximately 100 students. However, SMP Negeri 12 has a student body composed entirely of Indigenous Papuan students (100% OAP), whereas SMP Naena Muktipura consists of 90% Non-OAP students. SMP Negeri 12 Mimika has been making efforts to optimize the use of BOS funds to support better learning. However, based on preliminary observations, it remains unclear whether the use of BOS funds at SMP Negeri 12 Mimika is efficient and effective, and whether it has significantly impacted the quality of teaching and learning services. Therefore, this study seeks to examine the extent to which the efficiency and effectiveness of BOS fund utilization influence the quality of learning services at the school. This study aims to address a critical question regarding the impact of BOS fund management on the quality of education services at SMP Negeri 12 Mimika and SMP Naena Muktipura. The findings of this study are expected to contribute to improving the management of BOS funds and, ultimately, to enhancing the quality of education in schools within the region.

2. Literature review

2.1 Efficiency

Efficiency in the context of education refers to the extent to which available resources (including funding) are used to achieve optimal outcomes. In this case, the efficiency of BOS fund utilization can be assessed by how well the funds are used to enhance the quality of education in schools. According to Olga and Nurraihan (2023), efficiency can be measured by comparing the inputs used (such as funding, time, teaching staff, and facilities) with the outputs produced (such as students' learning outcomes). In other words, the lower the cost required to achieve maximum results, the more efficient the use of resources.

2.2 Effectiveness

Effectiveness refers to the extent to which predetermined goals are achieved. In the context of School Operational Assistance (BOS) fund utilization, effectiveness denotes the degree to which the funds contribute to enhancing the quality of educational services (Chandrasasmito, Kadir, & Fajriah, 2024). Effectiveness is associated with the achievement of more specific objectives such as improved facilities,

teacher training, or the provision of higher-quality learning materials. Therefore, effectiveness is not solely concerned with fund utilization but also with its impact on the learning process and outcomes.

2.3 School Operational Assistance Fund (BOS)

The School Operational Assistance (BOS) program is a government initiative that provides funding to help reduce the operational costs of public and private schools to improve the quality of education in Indonesia (Pontoh, Ilat, & Manossoh, 2017). BOS funds are allocated for various school operational needs, including the purchase of textbooks, facility improvements, remuneration for teaching and non-teaching staff, and extracurricular activities. According to the Regulation of the Minister of Education and Culture No. 8 of 2020 concerning the Technical Guidelines for BOS Management, these funds are expected to enhance the quality of education, both in terms of teaching quality and the availability of school infrastructure and facilities.

2.4 Quality of Teaching and Learning Services

The quality of teaching and learning services refers to a measure of how effectively educational activities are carried out through the interaction between teachers and students. This quality can be assessed through various aspects, including the quality of instruction, availability of learning facilities, curriculum implemented, and effective classroom management. According to Zahroh, Hilmiyati, and Banten (2024), learning quality is the result of a productive interaction between instruction, teaching materials, and the social dynamics within the classroom. In this study, the quality of teaching and learning services will be measured through aspects such as teachers' ability to deliver the material, the availability of relevant learning resources, and the effectiveness of technology integration in the learning process.

2.5 The Relationship Between Efficiency, Effectiveness, and the Quality of Teaching and Learning Services

The efficient and effective utilization of BOS funds can directly impact the quality of teaching and learning services. According to Eminarni, Lestari, and Prasetyaningrum (2025), schools that can use funds efficiently will have greater resources to enhance the quality of instruction and existing facilities, ultimately improving students' learning experiences. Conversely, ineffective fund use may hinder the development of the desired educational quality. Therefore, the efficiency and effectiveness of the use of BOS funds are expected to improve the quality of educational services provided by SMP Negeri 12 Timika and SMP Negeri Naena Muktipura.

3. Research methodology

This study employs a mixed-methods approach that combines quantitative and qualitative methods to analyze the influence of efficiency and effectiveness in the utilization of School Operational Assistance (BOS) funds on the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. The research sites were selected purposively, as both schools were BOS fund recipients with differing demographic backgrounds. This study was conducted during the even semester of the 2024/2025 academic year. The data used in this study were obtained from both primary and secondary sources. Primary data were collected through a five-point Likert scale questionnaire, semi-structured interviews with school principals, teachers, and BOS fund managers, and direct observations of classroom activities and school facilities. Secondary data were obtained from official school documents, including BOS fund utilization reports, School Activity and Budget Plans (RKAS), and other relevant literature.

The sampling technique used in this study was purposive sampling, involving 31 respondents, including school principals, teachers, and administrative staff. Quantitative data were analyzed using multiple linear regression to examine the influence of efficiency and effectiveness variables on the quality of teaching and learning. Prior to the regression analysis, several preliminary tests were conducted, including validity, reliability, normality, multicollinearity, heteroscedasticity tests, t-tests, and F-tests, to ensure the robustness of the model. Qualitative data were analyzed using content analysis techniques based on interview transcripts and relevant documentation. The operational definitions in this study included three main variables. The efficiency of BOS fund utilization (X_1) refers to the optimal,

targeted, and timely use of funds. Effectiveness (X_2) refers to the extent to which the BOS fund utilization successfully achieves the intended educational objectives. The quality of teaching and learning services (Y) is measured based on teaching methods, availability of facilities, quality of teacher–student interactions and student satisfaction with the learning process. All three variables were measured using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

4. Results and discussions

4.1 Research Result

4.1.1 Respondent Characteristics

Table 1. Results of Respondent Characteristics Analysis

Characteristics	Category	Number of Respondents	Percentage
Gender	Man	3	9.68%
	Woman	28	90.32%
Last education	S1	30	96.77%
	S2	1	3.23%
	Headmaster	1	3.23%
Position	vice principal	1	3.23%
	Teacher	29	93.55%

Source: Primary data processed in 2025

This study involved 31 respondents who were teaching staff at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. In terms of gender, most respondents were female, reflecting the predominance of women in the educational sector in both schools. This aligns with their significant role in managing and utilizing BOS funds. Although gender does not directly influence the efficiency and effectiveness of BOS fund utilization, the pedagogical approaches adopted by female educators may emphasize specific aspects, such as stronger interpersonal interactions and more holistic support for student development. In terms of educational background, most respondents held a bachelor's degree (S1). This indicates that nearly all the teaching staff at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura meet the national educational qualification standards. However, further training and professional development are necessary. Given that most respondents possess a bachelor's degree, it is essential to ensure that BOS funds are allocated to support training programs aimed at enhancing teaching quality, particularly by adopting more innovative instructional methods and keeping pace with developments in educational technology.

In terms of position, the majority of respondents were teachers. This predominance is particularly relevant because teachers are directly involved in the implementation of teaching activities and the utilization of BOS funds for various educational purposes. Although fewer in number, school principals and vice principals play a crucial role in managing and administering BOS funds at the school level. They are responsible for planning and monitoring fund usage to improve educational quality, including infrastructure upgrades and professional development for teachers. Overall, the respondents' characteristics provided significant insights within the context of this study. The findings indicate that most teaching staff hold a bachelor's degree and possess relevant experience and backgrounds in the learning process. With the predominance of female educators and the majority being teachers directly involved in the use of BOS funds, this research offers a deeper understanding of how the efficiency and effectiveness of BOS fund utilization can contribute to improving the quality of teaching and learning services in schools.

4.1.2 Validity Test

Tabel 2. Validity Test Results

Variables	Item	Correlation Coefficient	Information
Efficient Utilization of BOS Funds	Item 1	0.75	Valid

Variables	Item	Correlation Coefficient	Information
Effectiveness of BOS Fund Utilization	Item 2	0.80	Valid
	Item 3	0.70	Valid
	Item 4	0.76	Valid
	Item 5	0.82	Valid
	Item 6	0.78	Valid
	Item 7	0.79	Valid
	Item 8	0.74	Valid
	Item 9	0.77	Valid
	Item 10	0.81	Valid
	Item 1	0.72	Valid
Quality of Learning and Teaching Services	Item 2	0.73	Valid
	Item 3	0.68	Valid
	Item 4	0.75	Valid
	Item 5	0.74	Valid
	Item 6	0.77	Valid
	Item 7	0.76	Valid
	Item 8	0.79	Valid
	Item 9	0.80	Valid
	Item 10	0.78	Valid
	Item 1	0.82	Valid
Efficiency of BOS Fund Utilization	Item 2	0.85	Valid
	Item 3	0.80	Valid
	Item 4	0.83	Valid
	Item 5	0.78	Valid
	Item 6	0.81	Valid
	Item 7	0.79	Valid
	Item 8	0.77	Valid
	Item 9	0.76	Valid
	Item 10	0.80	Valid
	Item 1	0.82	Valid

Source: Primary data processed in 2025.

Based on the validity test results, all items within the variables of BOS fund utilization efficiency, BOS fund utilization effectiveness, and the quality of teaching and learning services had correlation coefficients higher than the critical r-value, indicating that all questionnaire items were valid. For the efficiency of BOS fund utilization variable, all items showed relatively high correlation coefficients, ranging from 0.70 to 0.82, signifying that the items are valid in measuring how efficiently BOS funds are being utilized in SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. This suggests that BOS funds allocated for various educational activities, such as purchasing teaching materials, teacher training, and improving educational facilities, have been well managed. For the effectiveness of BOS fund utilization variable, correlation coefficients ranging from 0.68 to 0.80 further confirmed the validity of the items. These items assess the positive impact of BOS funds on educational quality, including improved student examination scores, increased student participation in learning activities, and the implementation of a more needs-based curriculum. The validity of these items indicates that BOS funds have contributed significantly to enhancing the effectiveness of the teaching and learning process in the two schools.

Similarly, the variable of teaching and learning service quality demonstrated correlation coefficients ranging from 0.76 to 0.85, indicating that the items within this variable are valid for measuring the quality of instruction and facilities available in the schools. These items cover aspects such as teachers' ability to deliver material, the use of innovative teaching methods, the quality of classrooms and laboratories, and student participation in learning activities. The validity of these results suggests that the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura can be influenced by the efficient and effective utilization of the BOS funds. Overall, the validity tests conducted using SPSS confirmed that all items across the three research variables were valid. This ensures that the questionnaire used to collect data is reliable for measuring the efficiency and effectiveness of BOS fund utilization, as well as the quality of teaching and learning services in both schools. Therefore, the data gathered through this questionnaire can be used for further analysis of the impact of BOS funds on improving educational quality at these institutions.

4.1.3 Reliability Test

Table 3. Reliability Test Results Table

Variables	Cronbach's Alpha	Information
Efficient Utilization of BOS Funds	0.86	Reliable
Effectiveness of BOS Fund Utilization	0.83	Reliable
Quality of Learning and Teaching Services	0.89	Reliable

Based on the reliability test results conducted using SPSS, all variables in this study demonstrated Cronbach's alpha values greater than 0.60, indicating that the questionnaire used to measure each variable possessed good reliability. The variable "Efficiency of BOS Fund Utilization" recorded a Cronbach's alpha value of 0.86, reflecting a very high level of internal consistency. This suggests that the items used to measure the efficiency of BOS fund utilization at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura are strongly correlated with one another and capable of producing consistent results in assessing the efficiency of fund usage.

Effectiveness of BOS Fund Utilization: with a Cronbach's alpha value of 0.83, the effectiveness variable also demonstrated high reliability. This indicates that the items within this variable are dependable for measuring how effectively BOS funds are utilized to enhance the quality of education in schools. The consistency among items suggests that the data obtained can be confidently used for further analyses. Quality of Teaching and Learning Services: Cronbach's alpha value of 0.89 indicates excellent reliability for this variable. This demonstrates that the items used to assess the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura are highly correlated and yield consistent results. Therefore, this variable can be reliably used to measure the impact of BOS funds on the quality of the learning process.

Overall, the results of the reliability test indicated that the instrument used in this study possessed good internal consistency across all tested variables. The high Cronbach's alpha values for each variable suggest that the questionnaire employed in this research is reliable for measuring the efficiency and effectiveness of BOS fund utilization, as well as the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. Consequently, the data obtained can be considered trustworthy for further analysis of the impact of BOS funds on the quality of education in these schools.

4.1.4 Classical Assumption Test

1) Multicollinearity Test

To test for multicollinearity, the Variance Inflation Factor (VIF) and tolerance values were used. Generally, if the VIF value exceeds 10 or the tolerance value is less than 0.10, it indicates the presence of multicollinearity issues.

Table 5. Multollinearity Test

Variables	VIF	Tolerance
Efficient Utilization of BOS Funds	1.23	0.812
Effectiveness of BOS Fund Utilization	1.17	0.854

Source: Primary data processed in 2025

The results of the multicollinearity test indicate that the VIF values for both independent variables are less than 10, and the tolerance values are greater than 0.10, suggesting that there is no multicollinearity problem in this regression model.

2) Heteroscedasticity Test

To test for heteroscedasticity, either the Glejser or Breusch-Pagan test was used. If the significance value is greater than 0.05, it indicates that there is no heteroscedasticity.

Table 6. Heteroscedasticity Test Results

Test	Significance (p-value)
Breusch-Pagan test	0.679

Source: Primary data processed in 2025

The results of the heteroscedasticity test show a significance value greater than 0.05, indicating that there is no heteroscedasticity in this regression model.

3) Autocorrelation Test

The Durbin-Watson test was used to detect autocorrelation. An ideal Durbin-Watson value falls between 1.5 and 2.5.

Table 7. Autocorrelation Test Results

Durbin-Watson Test	Mark
Durbin-Watson	2.013

Source: Primary data processed in 2025

The results of the autocorrelation test show a Durbin-Watson value of 2.013, which falls within the expected range of 1.5–2.5. This indicates that there is no autocorrelation in the regression model.

4) Normality Test

The Kolmogorov-Smirnov or Shapiro-Wilk tests were used to test for normality. If the significance value is greater than 0.05, the residuals are considered to be normally distributed.

Table 8. Normality Test Results

Test	Significance (p-value)
Shapiro-Wilk Test	0.121

Source: Primary data processed in 2025

The results of the normality test indicated that the significance value was greater than 0.05, suggesting that the residuals in the regression model were normally distributed. Overall, the results of the classical assumption tests confirmed that the multiple linear regression model employed in this study satisfied all the required assumptions. No multicollinearity issues were identified, as indicated by Variance Inflation Factor (VIF) values below 10 and tolerance values above 0.10. The heteroscedasticity test also revealed no signs of heteroscedasticity, as evidenced by significance values exceeding 0.05. Furthermore, the Durbin-Watson statistic of 2.013 falls within the acceptable range (1.5–2.5), indicating the absence of autocorrelation. Therefore, the regression model is deemed valid and reliable for further

analysis of the influence of the efficiency and effectiveness of BOS fund utilization on the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura.

4.1.5 Multiple Linear Regression Test

1) T-test (Partial Test)

The t-test was employed to examine whether each independent variable (efficiency and effectiveness of BOS fund utilization) had a significant partial effect on the quality of teaching and learning services. A significance value (p-value) of less than 0.05 indicates that the alternative hypothesis is accepted, suggesting that the variable in question exerts a statistically significant influence.

Table 9. t-Test Results

Variables	Coefficient B	Standard Error	t	Sig.
Constants	2,510	0.789	3.18	0.003
Efficiency of BOS Fund Utilization (X1)	0.670	0.110	6.09	0.000
Effectiveness of BOS Fund Utilization (X2)	0.553	0.105	5.26	0.000

Source: Primary data processed in 2025

Based on the table above, it is evident that the efficiency of BOS fund utilization has a significance value of 0.000, which is lower than the 0.05 threshold. This indicates that the efficiency of BOS fund utilization has a statistically significant effect on the quality of teaching and learning. With a regression coefficient (B) of 0.670, a one-unit increase in efficiency leads to a 0.670-unit improvement in service quality. Similarly, BOS fund utilization has a significance value of 0.000, confirming its significant impact on the quality of teaching and learning services. The regression coefficient (B) of 0.553 suggests that a one-unit increase in effectiveness corresponds to a 0.553-unit increase in the quality of educational service delivery.

2) F Test

The F-test is used to examine whether, collectively, the independent variables (efficiency and effectiveness of BOS fund utilization) have a significant effect on the dependent variable (quality of teaching and learning services). This test assesses whether the overall regression model is significant.

Table 10. F Test Results

Source of Variation	Sum of Squares	Mean Square	F	Sig.
Regression	108,872	54,436	125.46	0.000
Residual	12,014	0.429		
Total	120,886			

Source: Primary data processed in 2025

The F-test yielded an F-value of 125.46 with a significance level of 0.000, which was below the 0.05 threshold. This result indicates that, collectively, the efficiency and effectiveness of BOS fund utilization significantly influence the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. In other words, both independent variables, whether individually or simultaneously, exert a substantial impact on the quality of education provided in these schools.

Based on the results of the t-test and F-test, it can be concluded that both the efficiency and effectiveness of BOS fund utilization significantly influence the quality of teaching and learning services. Partially, these two variables exert a substantial impact on the quality of education that students receive. The regression coefficients indicate that efficiency contributes more significantly to the improvement of teaching and learning service quality than effectiveness.

The efficiency of BOS fund utilization exerts a greater influence, with a regression coefficient of 0.670, indicating that the efficient use of BOS funds contributes more significantly to improving the quality of teaching. This includes well-managed allocations for the procurement of appropriate learning materials, development of school infrastructure, and teacher competency programs aligned with students' needs. Meanwhile, the effectiveness of BOS fund utilization, although slightly lower, with a coefficient of 0.553, still demonstrates the importance of using funds for activities that directly impact educational quality. These activities include enhancing the teaching methods employed by educators and improving the instructional materials and facilities that support the learning process.

4.1.6 Results of Differential Test Analysis

Table 11. Difference Test Results

Variables	Average of SMP N 12 Mimika	Average of Naena Muktipura Junior High School	t-test	Sig (2-tailed)	Information
Efficient Utilization of BOS Funds	40.5385	31.8182	3,068	0.006	significant
Effectiveness of BOS Fund Utilization	40.1538	33.0909	2,837	0.010	significant
Quality of Learning and Teaching Services	40.0769	33.8182	2,347	0.028	significant

The results of the independent samples t-test presented in the table indicate a statistically significant difference between SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura across the three main research variables: Efficiency of BOS Fund Utilization, Effectiveness of BOS Fund Utilization, and Quality of Teaching and Learning Services. For the variable Efficiency of BOS Fund Utilization, the mean score at SMP Negeri 12 Mimika was 40.54, notably higher than the mean score of 31.82 at SMP Negeri Naena Muktipura. The t-test result of 3.068 with a significance value of 0.006 ($p < 0.05$) confirms that this difference is statistically significant. This indicates that SMP Negeri 12 Mimika demonstrates significantly greater efficiency in managing BOS funds than its counterpart. Furthermore, regarding the Effectiveness of BOS Fund Utilization, the mean score at SMP Negeri 12 Mimika was 40.15, while SMP Negeri Naena Muktipura reported a lower average of 33.09. The t-test value of 2.837, with a significance level of 0.010, also suggests a statistically significant difference. This implies that, in addition to being more efficient, SMP Negeri 12 Mimika is also more effective in utilizing BOS funds to support educational goals, including the provision of learning facilities, the fulfillment of operational needs, and optimal support for teaching and learning activities.

In the final variable, namely the Quality of Teaching and Learning Services, SMP Negeri 12 Mimika again recorded a higher mean score (40.08) than SMP Negeri Naena Muktipura (33.82). The t-test result of 2.347, with a significance level of 0.028, confirms that this difference is statistically significant. This finding implies that the overall quality of educational services—encompassing the learning process, teacher performance, and supporting facilities is superior at SMP Negeri 12 Mimika compared to the comparison school. Collectively, these three results demonstrate that SMP Negeri 12 Mimika significantly outperforms SMP Negeri Naena Muktipura in terms of BOS fund utilization and the resulting quality of educational services provided.

Table 12. T-Test of BOS Fund Management

Variables	Mean	Mean Difference	t statistic	sig	Information
BOS funds managed by SMP N 12 Mimika	137,465,116.7	47,673,450.0	2,769	0.039	Significant
BOS funds managed by SMP N Naena Muktipura	89,791,666.7				

The results of the independent samples t-test indicate a statistically significant difference in the amount of BOS funds managed between SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. The

average BOS funds managed by SMP Negeri 12 Mimika amounted to IDR 137,465,116.70, while SMP Negeri Naena Muktipura managed only IDR 89,791,666.70, with a mean difference of IDR 47,673,450.00. The t-statistic value of 2.769 and a significance level (p-value) of 0.039 (< 0.05) confirm that this difference is statistically significant. This implies that SMP Negeri 12 Mimika demonstrably receives and manages a larger amount of BOS funds than SMP Negeri Naena Muktipura, a difference that may be influenced by factors such as school size, student enrollment, or administrative capacity.

4.2 Effectiveness and Efficiency of BOS Fund Utilization on the Quality of Learning and Teaching Services

Based on interviews with school principals and teachers, as well as field observations, the utilization of School Operational Assistance (BOS) funds at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura can be considered relatively effective and efficient in supporting the quality of teaching and learning services. These funds have been allocated to various needs that directly impact classroom instruction, such as the procurement of relevant teaching materials and tools aligned with the curriculum. The use of BOS funds to purchase projectors, interactive whiteboards, and instructional aids has enabled teachers to deliver lessons more effectively and engaging. Additionally, improvements in school infrastructure, including classroom renovations and the installation of air-conditioning units, have created a more conducive learning environment. The funds also supported teacher capacity-building activities, such as training in the integration of technology into pedagogy. However, despite these positive outcomes, some limitations remain. For instance, the number of training sessions remains limited and has yet to reach all teachers equitably, suggesting that the effectiveness of BOS fund utilization in fostering sustainable human resource development is not yet fully optimized.

The results of the regression analysis indicate that the efficiency of BOS (School Operational Assistance) fund utilization has a regression coefficient (B) of 0.670, implying that a one-unit increase in efficiency corresponds to a 0.670-unit improvement in the quality of teaching and learning services. The significance value of 0.000 suggests that the impact of efficiency on the quality of education is highly significant. Furthermore, the effectiveness of BOS fund utilization yields a regression coefficient (B) of 0.553, indicating that each unit increase in effectiveness leads to a 0.553-unit improvement in the quality of the instructional services. The significance value of 0.000 also confirms that the effect of effectiveness on educational quality is highly significant.

In terms of efficiency, BOS (School Operational Assistance) funds have been appropriately allocated to various programs aimed at enhancing teaching quality and educational facilities. However, several school principals reported that limited budget availability forced them to carefully prioritize which needs should be funded. This condition demands more prudent policymaking in planning fund utilization to avoid waste during implementation. Overall, despite challenges in BOS fund utilization—particularly concerning the limited allocation for more intensive teacher training—the use of these funds has been reasonably effective in supporting improvements in the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. With more efficient and well-targeted utilization, the quality of education in these schools can continue to improve.

4.3 Discussion

In this study, the results of quantitative data analysis obtained through multiple linear regression tests indicate that the efficiency and effectiveness of School Operational Assistance (BOS) fund utilization have a significant influence on the quality of teaching and learning services at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. The regression test results show that both independent variables positively affect the quality of education, with statistically significant coefficients for all variables. Based on the t-test results, both the efficiency (0.670) and effectiveness (0.553) of BOS fund utilization demonstrate a strong impact on the quality of educational services in the schools. The significance values, which are below 0.05 for both variables, affirm that the utilization of BOS funds plays a crucial role in improving the quality of teaching and learning.

The results of the F-test further confirm that these two variables, when considered simultaneously, have a significant influence on the quality of teaching and learning services at SMP Negeri 12 Mimika and

SMP Negeri Naena Muktipura. With a high F-value (125.46), this study demonstrates that the efficient and effective management of BOS funds can enhance the overall quality of education in these schools. The quantitative data reinforce the argument that well-targeted and optimal utilization of BOS funds can generate significant positive impacts on education, including improvements in facilities, learning tools, and teacher competency.

Efficient and effective management of School Operational Assistance (BOS) funds has been proven to significantly enhance the quality of teaching and learning services. A study conducted by Samsiarah, Agustinus, and Subroto (2022) on Madrasah Ibtidaiyah in Jayapura City found that the targeted allocation of BOS funds, such as for the procurement of teaching aids and teacher training, can substantially improve teaching quality. Similar findings were reported by Rahmat and Suhardi (2025) in their study of SMK Negeri 1 Lingsar, where efficient use of BOS funds led to improvements in facilities and teaching-learning activities. These findings are highly relevant to the cases of SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, where BOS funds are also allocated to improve physical infrastructure and increase the availability of instructional materials, directly influencing education quality.

Overall, the indicators of efficiency and effectiveness in the utilization of BOS funds, along with the quality of teaching and learning services, provide a clear picture of how BOS funding can influence various aspects of education in schools, from budget management to teaching quality and student learning outcomes. The improvement in the efficiency of BOS fund utilization is reflected in the high budget realization rates at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, with most of the funds being used in accordance with predetermined budget plans. This indicates that financial management in these schools is relatively sound, although there are still areas that require improvement, particularly in allocating funds for relevant educational activities.

Conversely, the quality of instructional material procurement that aligns with the curriculum also plays a significant role in improving the quality of learning. The procurement of appropriate teaching and learning materials, such as textbooks and practical tools, supports teachers in delivering subject matter effectively (Asnawati, 2019). However, despite the acquisition of numerous instructional tools and materials, some items still do not adequately meet the practical needs in the field. This indicates the need for further evaluation of the procurement process to ensure that every item purchased genuinely supports the learning process.

Student performance has also improved due to the utilization of BOS funds, particularly in terms of academic achievement and participation in extracurricular activities. The increase in exam scores and student involvement in various programs indicates that funds allocated for educational initiatives, such as teacher training and the procurement of instructional materials, have had a positive impact on the quality of learning. Nevertheless, disparities in achievement across subjects suggest that certain subjects still require more attention in terms of teaching materials and instructional methods. In addition, the improvement of educational facilities using BOS funds has had a positive impact on the quality of educational services (Harahap, Shunhaji, & Afif, 2024). Better classroom conditions, laboratories, and other facilities have helped create a more conducive learning environment for students. However, despite significant improvements in facilities, some areas—especially those related to technology and practical equipment—still require enhancement to better support technology-based learning in medical education.

A more structured and curriculum-aligned lesson planning approach has also emerged as an improvement following the implementation of BOS funds. These schools have successfully integrated curricula that are more relevant to students' needs and the developments in the field of education. However, implementing more innovative, technology-based curricula requires further teacher training to ensure optimal application. The integration of technology in teaching has also contributed to the improvement of learning quality (Malay, Tania, Ardiansyah, Adifka, & Irawan, 2025). With the availability of computers, projectors, and online learning applications, the teaching and learning processes have become more engaging and interactive.

Finally, community involvement in school activities funded by School Operational Assistance (BOS) plays a significant role in monitoring and providing input regarding fund utilization. School committees and parents actively contribute to ensuring that BOS funds are used for programs that genuinely support the quality of education. Although the level of engagement is generally good, some community members feel insufficiently informed about how the funds are being used. Therefore, to ensure the transparent and effective use of BOS funds, schools need to enhance communication and openness with the community by providing clear information on budget allocation and implemented programs.

The management of the School Operational Assistance (BOS) Fund is a critical issue in improving the quality of education in Indonesia, particularly at the junior secondary school level. Research conducted by Aini et al. (2024) revealed that corruption in the management of BOS funds can negatively impact school facilities and the quality of learning, indicating the importance of transparency and accountability in the use of such funds. Therefore, efficient and effective fund management is essential to ensure that the allocated resources are genuinely used to enhance educational quality. Furthermore, Firmansyah, Ahmad, and Rohana (2025) highlight the role of school committees in monitoring BOS funds, which contributes to improving the quality of education. School committees play a strategic role in overseeing the use of funds to ensure that they are well-targeted, particularly in improving the quality of basic education. This aligns with the findings at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, which show that the involvement of school committees and the wider community is crucial in ensuring transparency and effective fund utilization for the benefit of students.

The study conducted by Indrawan, Dahlia, Surahmat, Mustikawati, and Wulandari (2025) also demonstrated that the efficient utilization of BOS funds can enhance teachers' professional competencies, which in turn improves the quality of teaching in schools. At SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, teachers who participated in training programs funded by BOS showed improvement in their teaching skills and ability to integrate technology into the learning process. Nevertheless, further training is still needed to ensure that all teachers can implement innovative and curriculum-relevant teaching methods. Asnawi, Nurmiyati, and Suryatama (2025) linked the effectiveness of BOS fund utilization to the performance of school principals in managing educational programs. Principals with strong managerial skills can ensure that BOS funds are used efficiently and effectively, thereby supporting the improvement of the quality of education in schools. This is evident at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, where the principals play a crucial role in planning and managing BOS-funded programs to achieve established educational goals.

Based on the findings of Samsiarah et al. (2022) regarding the impact of BOS funds on the quality of teaching and learning services in Madrasah Ibtidaiyah, the funds can improve teaching quality, facility availability, and student engagement in extracurricular activities. These findings are consistent with those observed at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, where the use of BOS funds has enhanced the quality of teaching and educational facilities and encouraged student participation in extracurricular activities that support their potential development. The efficiency of BOS fund utilization is directly related to the quality of teaching that students receive. At SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, efficient BOS fund management has helped improve teaching quality by providing sufficient resources to support the learning process of students. However, further in-depth evaluation of fund distribution and program prioritization is necessary to ensure that funds are used optimally across all educational aspects.

Overall, the utilization of BOS funds at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura positively impacted various aspects of education, including teaching quality, educational facilities, student engagement, and academic achievement. However, several challenges remain to be addressed, such as improving technological facilities, increasing student participation in extracurricular activities, and enhancing transparency and communication between schools and parents. Through continuous evaluation and more comprehensive planning, the use of BOS funds can become more effective and provide greater benefits to improve the quality of education in both schools.

5. Conclusions

Based on the results of both quantitative and qualitative data analyses conducted in this study, it can be concluded that the utilization of School Operational Assistance (BOS) funds at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura has a significant impact on the quality of teaching and learning services. The quantitative analysis indicates that both the efficiency and effectiveness of BOS fund utilization positively affect the quality of teaching in these schools. The significant regression coefficients for these variables suggest that the targeted and efficient management of BOS funds can enhance the quality of teaching and the learning process, particularly in terms of facilities, teaching materials, and teacher competency development.

Qualitative data obtained through interviews and observations also support these quantitative findings, with school principals and teachers stating that BOS funds have been used to improve facilities, such as more comfortable classrooms and effective teaching aids. In addition, teacher training funded by BOS has contributed positively to improving teaching quality. However, despite the relatively efficient and effective use of BOS funds at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura, several challenges remain, including limited funding for extracurricular activities, restricted access to teacher training, and administrative issues related to record keeping and reporting. The lack of time and funding for professional development is a major obstacle to optimizing BOS fund utilization to enhance teacher competencies.

The efficient and effective use of School Operational Assistance (BOS) funds can significantly improve education quality, particularly in the areas of teaching, student academic achievement, school facilities, and community involvement. Transparent fund management, teacher training, technology integration into learning, and relevant curriculum development all contribute to educational progress at SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. Despite these advancements, challenges such as the unequal availability of technological infrastructure and the need for more efficient budget management must be addressed. Continuous evaluation of BOS fund utilization is crucial to ensure sustained positive outcomes and support the overall quality of education.

The t-test results indicate a significant difference in the amount of BOS (School Operational Assistance) funds managed between SMP Negeri 12 Mimika and SMP Negeri Naena Muktipura. The average BOS funds managed by SMP Negeri 12 Mimika amounted to IDR 137,465,116.70, while SMP Negeri Naena Muktipura managed only IDR 89,791,666.70, with an average difference of IDR 47,673,450.00. A t-statistic value of 2.769 and a significance level (p-value) of 0.039 (< 0.05) indicate that this difference is statistically significant. This means that SMP Negeri 12 Mimika objectively receives and manages a larger amount of BOS funds than SMP Negeri Naena Muktipura, which is likely influenced by the number of students enrolled.

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