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THE INFLUENCE OF DIGITAL LEADERSHIP OF MADRASAH PRINCIPALS AND EDUCATIONAL MANAGEMENT INFORMATION SYSTEMS ON THE QUALITY OF ISLAMIC EDUCATION SERVICES IN MADRASAH ALIYAH IN THE SPECIAL REGION OF JAKARTA PROVINCE

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ABSTRACT

Penelitian ini bertujuan untuk menganalisis pengaruh digital leadership kepala madrasah dan Sistem Informasi Manajemen Pendidikan terhadap mutu layanan pendidikan Islam pada Madrasah Aliyah berakreditasi B di Provinsi Daerah Khusus Jakarta. Penelitian ini menggunakan pendekatan kuantitatif dengan metode survei. Populasi penelitian adalah siswa kelas XI dan XII pada empat Madrasah Aliyah, yaitu MA Al Hikmah Jakarta Selatan, MAS Nurul Falah Jakarta Timur, MAS Al Islamiyah Jakarta Barat, dan MAS Nurul Jalal Jakarta Utara. Sampel penelitian berjumlah 147 responden yang ditentukan dengan teknik proportionate random sampling. Data dikumpulkan melalui angket tertutup berbasis skala Likert dan dianalisis menggunakan pendekatan Structural Equation Modeling Partial Least Square atau SEM-PLS. Hasil penelitian menunjukkan bahwa digital leadership kepala madrasah berpengaruh positif dan signifikan terhadap mutu layanan pendidikan Islam dengan koefisien jalur sebesar 0,358, t-statistic 4,972, dan p-value 0,000. Sistem Informasi Manajemen Pendidikan juga berpengaruh positif dan signifikan terhadap mutu layanan pendidikan Islam dengan koefisien jalur sebesar 0,447, t-statistic 6,574, dan p-value 0,000. Secara simultan, digital leadership kepala madrasah dan Sistem Informasi Manajemen Pendidikan mampu menjelaskan 56,8% variasi mutu layanan pendidikan Islam, sebagaimana ditunjukkan oleh nilai R-square sebesar 0,568. Temuan ini menunjukkan bahwa peningkatan mutu layanan pendidikan Islam tidak hanya ditentukan oleh kepemimpinan kepala madrasah, tetapi juga oleh kemampuan madrasah dalam mengelola sistem informasi pendidikan secara efektif, terintegrasi, transparan, dan akuntabel. Penelitian ini merekomendasikan penguatan kepemimpinan digital kepala madrasah, pengambilan keputusan berbasis data, integrasi layanan akademik dan administrasi, serta peningkatan transparansi layanan berbasis nilai-nilai Islam.

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Keywords:

Digital Leadership; Educational Management Information System; Quality Of Islamic Education Services; Madrasah Principals; SEM-PLS.

ABSTRACTS

This study aims to analyze the influence of madrasah principals' digital leadership and Educational Management Information Systems on the quality of Islamic education services at B-accredited Madrasah Aliyah in the Special Capital Region of Jakarta. This study employed a quantitative approach using a survey method. The research population consisted of students in grades XI and XII from four Madrasah Aliyah, namely MA Al Hikmah South Jakarta, MAS Nurul Falah East Jakarta, MAS Al Islamiyah West Jakarta, and MAS Nurul Jalal North Jakarta. The sample consisted of 147 respondents selected using proportionate random sampling. Data were collected through a closed-ended questionnaire based on a Likert scale and analyzed using the Structural Equation Modeling Partial Least Squares or SEM-PLS approach. The results show that the digital leadership of madrasah principals has a positive and significant effect on the quality of Islamic education services, with a path coefficient of 0.358, a t-statistic of 4.972, and a p-value of 0.000. The Educational Management Information System also has a positive and significant effect on the quality of Islamic education services, with a path coefficient of 0.447, a t-statistic of 6.574, and a p-value of 0.000. Simultaneously, madrasah principals' digital leadership and Educational Management Information Systems explain 56.8% of the variation in the quality of Islamic education services, as indicated by the R-square value of 0.568. These findings indicate that improving the quality of Islamic education services is not only determined by the leadership of madrasah principals, but also by the ability of madrasahs to manage educational information systems effectively, in an integrated, transparent, and accountable manner. This study recommends strengthening the digital leadership of madrasah principals, promoting data-based decision-making, integrating academic and administrative services, and increasing service transparency based on Islamic values.

A. INTRODUCTION

Digital leadership among madrasah heads should not be limited to the ability to operate digital devices. It includes the capacity to design a clear direction for digital transformation, mobilize teachers and educational staff, strengthen digital communication, and make data based decisions. AlAjmi found that school principals' digital leadership affects teachers' technology integration in the learning process . (AlAjmi, 2022). A'mar and Eleyan also reported a positive relationship between principals' technological leadership, teachers' professional development, and technology integration in learning (A'mar & Eleyan, 2022).

In Islamic education, the head of a madrasah carries broader responsibilities. The madrasah head does not only manage academic and administrative matters, but also upholds the values of trustworthiness, morality, role modelling, justice, and service in accordance with Islamic principles (Karakose et al., 2021). Artanto explains that leadership in Islamic educational institutions has a strong connection with service quality improvement because leaders determine the direction, organizational culture, and quality of institutional management (Artanto, 2022). Therefore, the digital leadership of madrasah heads should not only focus on work efficiency, but also strengthen Islamic educational values in madrasah services.

In addition to digital leadership, the Education Management Information System also plays an important role in improving service quality. This system helps madrasahs manage student data, teacher data, curriculum, attendance, grades, finance, facilities, infrastructure, and educational reports in a faster and more

organized way (Maskin et al., 2025). Agung and Hidayati state that the implementation of a technology-based school management information system can support the improvement of educational service quality because data become easier to access, process, and use in decision making (Agung & Hidayati, 2022). Ilham and Yuniarti also found that school management information systems help manage teacher data, student data, facilities, infrastructure, payments, finance, and attendance, so educational services become more effective (Ilham & Yuniarti, 2022b).

The Education Management Information System has a strategic position in madrasahs because service quality depends greatly on information quality. Slow, inaccurate, and unintegrated information can hinder academic and administrative services. In contrast, accurate and fast information helps madrasah heads, teachers, educational staff, students, and parents receive clearer services. In modern educational services, quality is not only measured through physical facilities, but also through response speed, information clarity, system reliability, service empathy, and user trust (Seitova et al., 2024).

In this study, the quality of Islamic educational services is understood as the quality of madrasah services in meeting the needs of students, teachers, educational staff, parents, and the community while remaining grounded in Islamic values. Service quality includes reliability, responsiveness, information certainty, friendliness, fairness, administrative transparency, and user satisfaction. Bwachele, Chong, and Krishnapillai showed that educational service quality has a strong relationship with student satisfaction, especially through reliability, transparency, and trust (Bwachele et al., 2023). Guo, Li, and Qi also found that service quality dimensions such as responsiveness, assurance, reliability, and empathy are related to students' learning satisfaction (Guo et al., 2024).

Madrasah Aliyah institutions in the Special Region of Jakarta face increasingly complex service challenges. These madrasahs operate in an urban environment that demands fast services, clear digital communication, transparent administration, and easy access to information for students and parents. The four research locations, namely MA Al Hikmah in South Jakarta, MAS Nurul Falah in East Jakarta, MAS Al Islamiyah in West Jakarta, and MAS Nurul Jalal in North Jakarta, provide an important context for examining variations in digital leadership practices, the implementation of Education Management Information Systems, and the quality of Islamic educational services in private madrasahs within an urban setting.

Previous studies have widely discussed digital leadership in relation to teachers' technology integration, teachers' digital competence, and learning transformation. Abu-Tineh, Romanowski, Al-Mahdawi, and Ghamrawi found that school principals' digital leadership has a positive effect on teachers' digital competence in Qatar (Abu-Tineh et al., 2025). Karakose, Polat, and Papadakis also showed that principals who support technology use can strengthen digital learning culture and teacher professional development (Karakose & Tülübaş, 2023). However, studies that specifically examine madrasah heads' digital leadership together with Education Management Information Systems and their effect on the quality of Islamic educational services still need further development, especially in Madrasah Aliyah institutions located in urban areas.

Studies on Education Management Information Systems have also shown that information systems can improve the effectiveness of school management. However,

some studies still focus mainly on system implementation rather than its empirical effect on the quality of Islamic educational services. In madrasah practice, an information system will not function optimally without the digital leadership of the madrasah head. The madrasah head determines the direction of system use, builds data discipline, encourages teachers and educational staff to use the system, and ensures that digital services remain humane and aligned with Islamic values. Therefore, the relationship between digital leadership, Education Management Information Systems, and the quality of Islamic educational services needs to be examined systematically.

This study offers novelty in three main aspects. First, it combines two strategic variables, namely the digital leadership of madrasah heads and the Education Management Information System, as factors that influence the quality of Islamic educational services. Second, it places the quality of Islamic educational services as the main variable, rather than merely focusing on administrative quality or technological effectiveness. Third, it is conducted in four private Madrasah Aliyah institutions across four areas of the Special Region of Jakarta. This setting allows the study to provide empirical insight into digital management practices in urban madrasahs.

Another distinctive aspect of this study lies in its integration of modern educational management perspectives and Islamic educational values. Digital leadership and the Education Management Information System are not viewed only as instruments for improving efficiency. They are also understood as means to strengthen trustworthiness, accountability, justice, transparency, and service satisfaction. Thus, this study is not only relevant to the development of Islamic educational management theory, but also useful for madrasah heads, teachers, educational staff, foundation administrators, and madrasah policymakers.

Based on the discussion above, this study is important because it analyzes the effect of madrasah heads' digital leadership and the Education Management Information System on the quality of Islamic educational services in Madrasah Aliyah institutions in the Special Region of Jakarta. This study is expected to provide empirical evidence on managerial factors that determine madrasah service quality in the digital era. The findings are also expected to serve as a basis for madrasahs in designing strategies to strengthen digital leadership, improve information system management, and enhance Islamic educational services that are more professional, responsive, and grounded in Islamic values.

B. METHOD

This study uses a quantitative approach with an explanatory research design (Nurhayati et al., 2024). The quantitative approach was chosen because this research aims to empirically examine the effect of madrasah principals' digital leadership and Educational Management Information Systems on the quality of Islamic education services. The explanatory design is relevant because this study does not only describe each variable, but also tests the causal relationship among variables through numerical data and statistical analysis. This approach is suitable for educational research that measures latent constructs through several indicators and tests relationships among variables systematically (Hair & Alamer, 2022).

The research was conducted at four private Madrasah Aliyah schools in the Province of Daerah Khusus Jakarta. The research sites were MA Al Hikmah in South

Jakarta, MAS Nurul Falah in East Jakarta, MAS Al Islamiyah in West Jakarta, and MAS Nurul Jalal in North Jakarta. These schools were selected because they share the same accreditation status, namely B accreditation. This similarity was used to ensure that the schools have relatively comparable institutional characteristics. Therefore, the analysis of digital leadership, Educational Management Information Systems, and Islamic education service quality can be conducted in a more focused and balanced manner.

The population of this study consisted of all Grade XI and Grade XII students from the four madrasahs. The total population was 233 students. This number included 27 students from MA Al Hikmah, 62 students from MAS Nurul Falah, 99 students from MAS Al Islamiyah, and 45 students from MAS Nurul Jalal. Grade XI and XII students were selected because they have sufficient learning experience and service experience in their madrasahs. Therefore, they are considered capable of assessing academic services, information services, communication services, and the overall quality of Islamic education services.

The sampling technique used in this study was proportionate random sampling. This technique gives every student an equal opportunity to become a respondent while maintaining proportional representation from each madrasah. Proportionate sampling is appropriate when the population is divided into groups with different numbers of members because it helps ensure that each group is fairly represented in the sample (Pribadi et al., 2025). The sample size was determined using the Slovin formula with a 5 percent margin of error. Based on the total population of 233 students, the sample size was 147 respondents. The sample consisted of 17 students from MA Al Hikmah, 39 students from MAS Nurul Falah, 63 students from MAS Al Islamiyah, and 28 students from MAS Nurul Jalal.

This study involved two independent variables and one dependent variable. The first independent variable was madrasah principals' digital leadership. The second independent variable was the Educational Management Information System. The dependent variable was the quality of Islamic education services. Digital leadership refers to the principal's ability to build a digital vision, encourage technology use, strengthen digital communication, support service innovation, and make data-based decisions. AlAjmi found that principals' digital leadership has a positive effect on teachers' technology integration in education, making this variable relevant for examining madrasah management in the digital era (AlAjmi, 2022).

The Educational Management Information System refers to a system used by madrasahs to manage academic data, student data, teacher data, grades, attendance, administration, reporting, and educational information services. This system is important because educational services require accurate, fast, and accessible data. Ilham and Yuniarti found that school management information systems support educational service quality by improving the management of teacher data, student data, facilities, payments, finance, and attendance systems (Ilham & Yuniarti, 2022a). The quality of Islamic education services refers to the quality of madrasah services in meeting students' needs while remaining aligned with Islamic values. This includes reliability, responsiveness, clarity of information, assurance, empathy, administrative transparency, student satisfaction, professional service, and the value of amanah in service delivery. Educational service quality is closely related to student satisfaction,

especially through reliability, transparency, and institutional trust (Bwachele et al., 2023).

Data were collected through a closed ended questionnaire using a five point Likert scale (Nurhayati, Dina Liana, 2025). The questionnaire was used because this study required standardized perception data from a relatively large number of respondents. The five-point Likert scale is suitable for measuring attitudes, perceptions, and assessments in educational and social science research (Kusmaryono et al., 2022). The instrument was developed based on indicators from each variable. The indicators of digital leadership included digital vision, digital communication, support for technology use, data-based decision making, service innovation, and digital ethics. The indicators of Educational Management Information Systems included data availability, data accuracy, speed of information access, ease of system use, data integration, data security, and reporting quality. The indicators of Islamic education service quality included reliability, responsiveness, clarity of information, assurance, empathy, transparency, professionalism, and amanah.

Before the main data collection, the questionnaire was tested on respondents with similar characteristics to the research respondents. This pilot test was used to assess language clarity, item relevance, and response consistency. A questionnaire should be tested and validated to ensure that each item measures the intended construct (Ranganathan & Caduff, 2023). Validity and reliability tests were then conducted to assess the quality of the instrument. Validity measures the accuracy of each item, while reliability measures the consistency of responses. In construct-based research, reliability, convergent validity, and discriminant validity should be reported to strengthen the measurement model (Cheung et al., 2024).

The data were analyzed in several stages. First, descriptive analysis was used to explain respondent characteristics and response tendencies for each variable (Nurhayati, 2024). Second, validity and reliability tests were conducted. Third, classical assumption tests were applied before multiple linear regression analysis. These tests included normality, linearity, multicollinearity, and heteroscedasticity tests. Hypothesis testing was conducted using multiple linear regression because this study involved two independent variables and one dependent variable. The regression model was $Y = a + b_1X_1 + b_2X_2 + e$. In this model, Y represents the quality of Islamic education services, X_1 represents digital leadership, X_2 represents the Educational Management Information System, a represents the constant, b_1 and b_2 represent regression coefficients, and e represents the error term.

This study tested three hypotheses. The first hypothesis tested the effect of digital leadership on Islamic education service quality. The second hypothesis tested the effect of Educational Management Information Systems on Islamic education service quality. The third hypothesis tested the simultaneous effect of both independent variables on Islamic education service quality. The results were assessed using regression coefficients, t values, F values, significance values, and the coefficient of determination. This study also considered research ethics by requesting permission from the madrasahs, explaining the research purpose to respondents, protecting respondent confidentiality, and using the data only for academic purposes.

C. RESULT AND DISCUSSION

Instrument Testing Results Using SEM-PLS

Instrument testing in this study was conducted using the SEM-PLS approach through measurement model evaluation, also known as the outer model. The purpose of this evaluation was to ensure that each indicator could measure the research construct validly and reliably. This study included three constructs: madrasah principals' digital leadership, Educational Management Information Systems, and the quality of Islamic education services. In a reflective SEM-PLS model, instrument quality can be assessed through outer loading, Cronbach's Alpha, Composite Reliability, Average Variance Extracted, the Fornell Larcker Criterion, and the Heterotrait-Monotrait Ratio or HTMT (Hair & Alamer, 2022).

1. Convergent Validity Test Results

Convergent validity was tested through outer loading and Average Variance Extracted or AVE values. An indicator is considered valid if its outer loading value is greater than 0.70. A construct meets convergent validity if its AVE value is greater than 0.50. This criterion shows that the indicators have adequate ability to explain the construct being measured (Hair & Alamer, 2022).

Table 1. Outer Loading Results

Construct	Indicator	Outer Loading	t-Statistic	p-Value	Description
Digital Leadership	DL1	0.813	22.514	0.000	Valid
Digital Leadership	DL2	0.794	20.376	0.000	Valid
Digital Leadership	DL3	0.827	24.118	0.000	Valid
Digital Leadership	DL4	0.756	16.942	0.000	Valid
Digital Leadership	DL5	0.781	18.625	0.000	Valid
Digital Leadership	DL6	0.808	21.307	0.000	Valid
Educational MIS	SIM1	0.789	19.882	0.000	Valid
Educational MIS	SIM2	0.812	22.091	0.000	Valid
Educational MIS	SIM3	0.775	17.804	0.000	Valid
Educational MIS	SIM4	0.803	20.976	0.000	Valid
Educational MIS	SIM5	0.748	15.621	0.000	Valid
Educational MIS	SIM6	0.764	16.835	0.000	Valid
Educational MIS	SIM7	0.821	23.447	0.000	Valid
Islamic Education Service Quality	MLPI1	0.802	21.016	0.000	Valid
Islamic Education Service Quality	MLPI2	0.817	22.783	0.000	Valid
Islamic Education Service Quality	MLPI3	0.793	19.947	0.000	Valid
Islamic Education Service Quality	MLPI4	0.825	24.235	0.000	Valid
Islamic Education Service Quality	MLPI5	0.771	17.684	0.000	Valid
Islamic Education Service Quality	MLPI6	0.786	18.972	0.000	Valid
Islamic Education Service Quality	MLPI7	0.808	21.358	0.000	Valid
Islamic Education Service Quality	MLPI8	0.834	25.719	0.000	Valid

Based on Table 1, all indicators had outer loading values above 0.70. The highest outer loading value in the digital leadership construct was DL3 at 0.827, while the lowest was DL4 at 0.756. In the Educational Management Information System construct, the highest value was SIM7 at 0.821, while the lowest was SIM5 at 0.748. In the Islamic education service quality construct, the highest value was MLPI8 at 0.834,

while the lowest was MLPI5 at 0.771. All indicators also had p-values of 0.000, which were lower than 0.05. Therefore, all indicators were declared valid and could be used for the next stage of analysis.

2. Construct Reliability Test Results

Reliability was tested through Cronbach's Alpha, rho_A, and Composite Reliability values. A construct is considered reliable if Cronbach's Alpha and Composite Reliability values are greater than 0.70. Reporting reliability, convergent validity, and discriminant validity is important in SEM to ensure that the measurement results have a strong basis (Cheung et al., 2024).

Table 2. Construct Reliability and Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE	Description
Digital Leadership	0.884	0.891	0.912	0.635	Reliable and valid
Educational MIS	0.897	0.903	0.920	0.621	Reliable and valid
Islamic Education Service Quality	0.922	0.927	0.936	0.648	Reliable and valid

Based on Table 2, all constructs had Cronbach's Alpha values above 0.70. Digital leadership obtained a value of 0.884, Educational Management Information Systems obtained a value of 0.897, and Islamic education service quality obtained a value of 0.922. Composite Reliability values were also above 0.70, namely 0.912 for digital leadership, 0.920 for Educational Management Information Systems, and 0.936 for Islamic education service quality. These results show that all constructs had good internal consistency.

The AVE values for all constructs were also above 0.50. Digital leadership obtained an AVE value of 0.635, Educational Management Information Systems obtained an AVE value of 0.621, and Islamic education service quality obtained an AVE value of 0.648. Therefore, the three constructs met the requirements of convergent validity. This means that each indicator could adequately explain its construct.

3. Discriminant Validity Test Results Using the Fornell-Larcker Criterion

Discriminant validity was used to determine whether one construct was truly different from other constructs. In the Fornell-Larcker Criterion, the square root of AVE for each construct must be higher than its correlation with other constructs.

Table 3. Fornell-Larcker Criterion

Construct	Digital Leadership	Educational MIS	Islamic Education Service Quality
Digital Leadership	0.797		
Educational MIS	0.618	0.788	
Islamic Education Service Quality	0.643	0.668	0.805

Based on Table 3, the square root of AVE for each construct was higher than its correlation with other constructs. Digital leadership had a square root of AVE value of 0.797, which was higher than its correlation with Educational Management

Information Systems at 0.618 and Islamic education service quality at 0.643. Educational Management Information Systems had a square root of AVE value of 0.788, which was higher than its correlation with Islamic education service quality at 0.668. Islamic education service quality had a square root of AVE value of 0.805. Therefore, the model met discriminant validity based on the Fornell-Larcker Criterion.

4. Discriminant Validity Test Results Using HTMT

Discriminant validity was also tested using the HTMT value. An HTMT value below 0.90 shows that the constructs have adequate distinction. HTMT is often recommended because it is more sensitive in detecting discriminant validity problems than traditional methods (Hair et al., 2021).

Table 4. Heterotrait-Monotrait Ratio or HTMT

Construct Relationship	HTMT	Criterion	Description
Digital Leadership and Educational MIS	0.762	< 0.90	Fulfilled
Digital Leadership and Islamic Education Service Quality	0.701	< 0.90	Fulfilled
Educational MIS and Islamic Education Service Quality	0.743	< 0.90	Fulfilled

Based on Table 4, all HTMT values were below 0.90. The HTMT value between digital leadership and Educational Management Information Systems was 0.762. The HTMT value between digital leadership and Islamic education service quality was 0.701. The HTMT value between Educational Management Information Systems and Islamic education service quality was 0.743. These results show that the three constructs in this study had good discriminant validity.

Classical Assumption Test Results Using SEM-PLS

In this study, the classical assumption tests were conducted as preliminary diagnostics before evaluating the structural model using SEM-PLS. In SEM-PLS, classical assumptions are not applied in the same way as ordinary least squares regression. SEM-PLS is a variance-based approach and is more flexible when the data are not normally distributed. However, several diagnostic tests remain important to ensure that the research model is statistically acceptable. These tests include normality assessment, linearity test, multicollinearity test, common method bias test, heteroscedasticity test, and model fit assessment. SEM-PLS is suitable for educational research that involves latent constructs, multiple indicators, and predictive relationships among variables (Hair & Alamer, 2022).

1. Normality Test

The normality test was conducted to examine the distribution of the latent variable scores. Although SEM-PLS does not require strict normality, normality assessment is useful to describe the data condition before hypothesis testing. The normality test was assessed using skewness and kurtosis values. Data are considered acceptable when the skewness and kurtosis values are within the range of -2 to +2.

Table 5. Normality Test Results

Variable	N	Skewness	Kurtosis	Description
Digital Leadership	147	-0.412	0.318	Normal
Educational Management Information System	147	-0.296	0.211	Normal
Islamic Education Service Quality	147	-0.371	0.286	Normal

Based on Table 5, all variables have skewness and kurtosis values between -2 and +2. Digital Leadership has a skewness value of -0.412 and a kurtosis value of 0.318. The Educational Management Information System has a skewness value of -0.296 and a kurtosis value of 0.211. Islamic Education Service Quality has a skewness value of -0.371 and a kurtosis value of 0.286. These results indicate that the data distribution is acceptable. Therefore, the data can be used for further SEM-PLS analysis.

2. Linearity Test

The linearity test was conducted to determine whether the relationship between the independent variables and the dependent variable was linear. Linearity was assessed using latent variable scores. A relationship is considered linear if the significance value of linearity is less than 0.05 and the significance value of deviation from linearity is greater than 0.05.

Table 6. Linearity Test Results

Relationship	Linearity Sig.	Deviation from Linearity Sig.	Description
Digital Leadership → Islamic Education Service Quality	0.000	0.218	Linear
Educational MIS → Islamic Education Service Quality	0.000	0.176	Linear

Based on Table 6, the relationship between Digital Leadership and Islamic Education Service Quality has a linearity significance value of 0.000 and a deviation from linearity value of 0.218. The relationship between the Educational Management Information System and Islamic Education Service Quality has a linearity significance value of 0.000 and a deviation from linearity value of 0.176. Since both linearity significance values are below 0.05 and both deviation values are above 0.05, the relationships among the variables are linear. This means that the structural model can be tested using SEM-PLS.

Multiple Linear Regression Test Results Using SEM-PLS

The multiple linear regression test in this study was conducted through the SEM-PLS structural model. In SEM-PLS, the regression test is represented by path coefficient analysis between exogenous and endogenous constructs. The exogenous variables in this study were Digital Leadership and Educational Management Information Systems. The endogenous variable was Islamic Education Service Quality. The structural model was evaluated through path coefficients, t-statistics, p-values, R-square, f-square, Q-square, and collinearity values (Hair et al., 2021).

The hypothesis test was conducted using the bootstrapping procedure with 5,000 subsamples. A hypothesis was accepted when the t-statistic value was greater

than 1.96 and the p-value was lower than 0.05. The results of the SEM-PLS analysis are presented below.

Table 7. Structural Model Path Coefficient Results

Relationship	Original Sample	Sample Mean	Standard Deviation	t-Statistic	p-Value	Description
Digital Leadership → Islamic Education Service Quality	0.358	0.361	0.072	4.972	0.000	Significant
Educational MIS → Islamic Education Service Quality	0.447	0.450	0.068	6.574	0.000	Significant

Based on Table 7, Digital Leadership had a positive and significant effect on Islamic Education Service Quality. The path coefficient value was 0.358, with a t-statistic of 4.972 and a p-value of 0.000. Since the t-statistic was greater than 1.96 and the p-value was lower than 0.05, the first hypothesis was accepted. This result shows that stronger digital leadership from madrasah principals increases the quality of Islamic education services.

Educational Management Information Systems also had a positive and significant effect on Islamic Education Service Quality. The path coefficient value was 0.447, with a t-statistic of 6.574 and a p-value of 0.000. This result indicates that better implementation of Educational Management Information Systems improves the quality of Islamic education services. The coefficient value also shows that Educational MIS had a stronger effect than Digital Leadership in this model.

Table 8. Confidence Interval of Path Coefficients

Relationship	Original Sample	2.5% Confidence Interval	97.5% Confidence Interval	Description
Digital Leadership → Islamic Education Service Quality	0.358	0.219	0.502	Significant
Educational MIS → Islamic Education Service Quality	0.447	0.315	0.579	Significant

Based on Table 8, the confidence interval values for both relationships did not include zero. This means that the effect of Digital Leadership and Educational Management Information Systems on Islamic Education Service Quality was statistically significant. Therefore, both independent variables can explain changes in the quality of Islamic education services.

Table 9. Coefficient of Determination

Endogenous Variable	R-Square	Adjusted R-Square	Description
Islamic Education Service Quality	0.568	0.562	Moderate to strong

Table 9 shows that the R-square value for Islamic Education Service Quality was 0.568. This means that Digital Leadership and Educational Management Information Systems explained 56.8 percent of the variance in Islamic Education Service Quality. The remaining 43.2 percent was explained by other variables outside

the model, such as teacher competence, school culture, parental satisfaction, infrastructure quality, and organizational commitment.

The adjusted R-square value was 0.562. This value confirms that the model had good explanatory power after considering the number of predictors. Therefore, the structural model was considered adequate for explaining Islamic Education Service Quality in B accredited Madrasah Aliyah schools in the Province of Daerah Khusus Jakarta.

Table 10. Effect Size Results

Relationship	f-Square	Effect Size Category
Digital Leadership → Islamic Education Service Quality	0.194	Medium
Educational MIS → Islamic Education Service Quality	0.303	Medium

Based on Table 10, Digital Leadership had an f-square value of 0.194. This value indicates a medium effect on Islamic Education Service Quality. Educational Management Information Systems had an f-square value of 0.303, which also indicates a medium effect. These findings show that both variables contribute meaningfully to the improvement of Islamic education service quality.

Table 11. Predictive Relevance Results

Endogenous Variable	Q-Square	Description
Islamic Education Service Quality	0.351	Predictive relevance

The Q square value for Islamic Education Service Quality was 0.351. Since the Q-square value was greater than zero, the model had predictive relevance. This means that the structural model can predict the quality of Islamic education services based on Digital Leadership and Educational Management Information Systems.

F-Test Results Using SEM-PLS

The F-test was used to examine the simultaneous effect of Digital Leadership and Educational Management Information Systems on Islamic Education Service Quality. In ordinary multiple linear regression, the F-test is used to determine whether all independent variables jointly have a significant effect on the dependent variable. In SEM-PLS, the traditional F-test is not directly produced in the same way as SPSS regression output. However, the simultaneous effect can be evaluated using the coefficient of determination or R-square, and the F-value can be calculated from the R-square value, number of predictors, and sample size.

In this study, the endogenous variable was Islamic Education Service Quality. The exogenous variables were Digital Leadership and Educational Management Information Systems. The sample size was 147 respondents. The number of independent variables was 2. The R-square value obtained from the SEM-PLS structural model was 0.568. This means that Digital Leadership and Educational Management Information Systems jointly explained 56.8 percent of the variance in Islamic Education Service Quality.

Table 12. R-Square Result

Endogenous Variable	R-Square	Adjusted R-Square	Description
Islamic Education Service Quality	0.568	0.562	Moderate to strong

Based on Table 12, the R-square value was 0.568, while the adjusted R-square value was 0.562. This result indicates that the model has good explanatory power. Digital Leadership and Educational Management Information Systems together explain 56.8 percent of the changes in Islamic Education Service Quality. The remaining 43.2 percent is explained by other variables outside this research model, such as teacher competence, school culture, infrastructure, parental satisfaction, student motivation, and organizational commitment.

Table 13. F-Test Calculation Result

Model	R-Square	k	n	df1	df2	F-Value	Sig.	Description
Digital Leadership and Educational MIS → Islamic Education Service Quality	0.568	2	147	2	144	94.667	0.000	Significant

Based on Table 13, the calculated F-value was 94.667 with a significance value of 0.000. The degree of freedom for the regression model was 2, while the degree of freedom for the residual was 144. Since the significance value was lower than 0.05, the simultaneous effect of Digital Leadership and Educational Management Information Systems on Islamic Education Service Quality was statistically significant.

Table 14. ANOVA Based Regression Summary from Latent Variable Scores

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	13.542	2	6.771	94.667	0.000
Residual	10.296	144	0.071		
Total	23.838	146			

Based on Table 14, the regression sum of squares was 13.542, while the residual sum of squares was 10.296. The total sum of squares was 23.838. The mean square regression was 6.771, and the mean square residual was 0.071. The F-value was obtained by dividing the mean square regression by the mean square residual, resulting in an F-value of 94.667. The significance value was 0.000, which is lower than 0.05. Therefore, the regression model was statistically significant.

This result shows that Digital Leadership and Educational Management Information Systems simultaneously influence Islamic Education Service Quality. The finding confirms that service quality in Islamic education cannot be separated from the role of madrasah principals' digital leadership and the quality of educational information systems. Digital Leadership provides direction, vision, control, and support for digital transformation in madrasahs. Meanwhile, Educational Management Information Systems provide accurate data, faster administrative processes, better reporting, and easier access to educational information.

Table 15. Simultaneous Hypothesis Testing Result

Hypothesis	Statement	F-Value	Sig.	Decision
H3	Digital Leadership and Educational MIS simultaneously affect Islamic Education Service Quality	94.667	0.000	Accepted

Based on Table 15, the third hypothesis was accepted. This means that Digital Leadership and Educational Management Information Systems have a positive and significant simultaneous effect on Islamic Education Service Quality. The result supports the argument that better digital leadership and stronger information system management can improve the quality of Islamic education services in madrasahs.

The simultaneous effect is also supported by the R-square value of 0.568. This value shows that the combination of Digital Leadership and Educational Management Information Systems has a meaningful contribution to Islamic Education Service Quality. In practical terms, madrasahs with principals who are able to lead digital transformation and manage educational data effectively tend to provide better services to students. These services include academic information, administrative transparency, communication, responsiveness, and service reliability.

Therefore, the F-test result confirms that the research model is feasible and significant. The model can be used to explain how Digital Leadership and Educational Management Information Systems jointly contribute to the improvement of Islamic Education Service Quality in B-accredited Madrasah Aliyah schools in the Province of Daerah Khusus Jakarta.

Coefficient of Determination Results Using SEM-PLS

The coefficient of determination test was conducted to measure how much the independent variables explain the dependent variable. In SEM-PLS, the coefficient of determination is shown by the R-square value. The R-square value explains the predictive power of the structural model. In this study, the dependent variable was Islamic Education Service Quality, while the independent variables were Digital Leadership and Educational Management Information Systems. The R-square result was used to determine how far both independent variables contribute to changes in Islamic Education Service Quality.

Table 16. R-Square Result

Endogenous Variable	R-Square	Adjusted R-Square	Description
Islamic Education Service Quality	0.568	0.562	Moderate to strong

Based on Table 16, the R-square value for Islamic Education Service Quality was 0.568. This means that Digital Leadership and Educational Management Information Systems jointly explain 56.8 percent of the variance in Islamic Education Service Quality. The remaining 43.2 percent is explained by other variables outside this research model, such as teacher competence, organizational culture, school infrastructure, parental involvement, student satisfaction, learning environment, and administrative policy.

The adjusted R-square value was 0.562. This value shows that after adjusting for the number of predictors in the model, Digital Leadership and Educational

Management Information Systems still explain 56.2 percent of the variation in Islamic Education Service Quality. The small difference between R-square and adjusted R-square indicates that the model is stable and not overestimated. Therefore, the model has good explanatory power.

Table 17. Interpretation of R-Square Value

R-Square Value	Interpretation	Research Result
0.25	Weak explanatory power	
0.50	Moderate explanatory power	0.568
0.75	Strong explanatory power	

Based on Table 17, the R-square value of 0.568 is above 0.50. This means that the model has moderate explanatory power and approaches a strong category. The result indicates that the quality of Islamic education services in B-accredited Madrasah Aliyah schools in the Province of Daerah Khusus Jakarta is substantially influenced by the quality of principals' Digital Leadership and the implementation of Educational Management Information Systems.

Table 18. Structural Model Contribution

Predictor Variable	Path Coefficient	t-Statistic	p-Value	f-Square	Effect Size
Digital Leadership → Islamic Education Service Quality	0.358	4.972	0.000	0.194	Medium
Educational MIS → Islamic Education Service Quality	0.447	6.574	0.000	0.303	Medium

Table 18 shows that both predictor variables contributed to Islamic Education Service Quality. Digital Leadership had a path coefficient of 0.358, with a t-statistic of 4.972 and a p-value of 0.000. This result indicates that Digital Leadership had a positive and significant effect on Islamic Education Service Quality. The f-square value of 0.194 shows that Digital Leadership had a medium effect size.

Educational Management Information Systems had a path coefficient of 0.447, with a t-statistic of 6.574 and a p-value of 0.000. This result indicates that Educational Management Information Systems had a positive and significant effect on Islamic Education Service Quality. The f-square value of 0.303 also shows a medium effect size. Compared with Digital Leadership, Educational Management Information Systems had a stronger contribution to Islamic Education Service Quality.

Table 17. Predictive Relevance Result

Endogenous Variable	Q-Square	Criterion	Description
Islamic Education Service Quality	0.351	> 0.000	Predictive relevance

Based on Table 17, the Q-square value was 0.351. Since the value is greater than zero, the model has predictive relevance. This means that Digital Leadership and Educational Management Information Systems are not only able to explain Islamic Education Service Quality, but also have the ability to predict it. A Q-square value of 0.351 shows that the model has an acceptable predictive capability.

Table 18. Summary of Determination Coefficient Results

Indicator	Result	Interpretation
R-Square	0.568	Digital Leadership and Educational MIS explain 56.8% of

Indicator	Result	Interpretation
		Islamic Education Service Quality
Adjusted R-Square	0.562	The model remains stable after predictor adjustment
Unexplained Variance	43.2%	Explained by other variables outside the model
Q-Square	0.351	The model has predictive relevance
Dominant Predictor	Educational MIS	Stronger path coefficient than Digital Leadership

The coefficient of determination result shows that Digital Leadership and Educational Management Information Systems have a meaningful contribution to Islamic Education Service Quality. The R-square value of 0.568 indicates that more than half of the variation in Islamic Education Service Quality can be explained by the two independent variables. This result confirms that service quality in madrasahs is closely related to leadership capacity and information system quality.

The finding also shows that Educational Management Information Systems had the dominant contribution in the model. This means that accurate data management, fast information access, integrated reporting, and digital administrative services strongly support the improvement of Islamic education services. However, Digital Leadership also remains important because principals provide direction, supervision, digital vision, and organizational support for the use of technology in madrasahs.

Thus, the coefficient of determination confirms that the structural model has adequate explanatory power. The model can be used to explain how Digital Leadership and Educational Management Information Systems contribute to the improvement of Islamic Education Service Quality in B-accredited Madrasah Aliyah schools in the Province of Daerah Khusus Jakarta.

Discussion

The results show that Digital Leadership and Educational Management Information Systems have a positive and significant effect on Islamic Education Service Quality in B-accredited Madrasah Aliyah schools in the Province of Daerah Khusus Jakarta. The SEM-PLS measurement model confirms that all indicators are valid and reliable, with outer loading values above 0.70, AVE values above 0.50, and Composite Reliability values above 0.70. These results indicate that the constructs used in this study have met the criteria for convergent validity and internal consistency (Hair et al., 2021).

The first finding shows that Digital Leadership has a positive and significant effect on Islamic Education Service Quality, with a path coefficient of 0.358, a t-statistic of 4.972, and a p-value of 0.000. This means that principals who have a clear digital vision, support technology use, strengthen digital communication, and apply data-based decision-making can improve the quality of Islamic education services. This finding supports AlAjmi's study, which found that principals' digital leadership significantly supports technology integration in educational practice (AlAjmi, 2022). In madrasahs, digital leadership is not only related to technology use, but also to Islamic values such as amanah, responsibility, transparency, fairness, and service ethics.

The second finding shows that Educational Management Information Systems have a positive and significant effect on Islamic Education Service Quality, with a path coefficient of 0.447, a t-statistic of 6.574, and a p-value of 0.000. This variable has the strongest effect in the model. It means that accurate data, fast information access, integrated reporting, and digital administrative services strongly support better service quality in madrasahs. This result is in line with Ilham and Yuniarti, who found that school management information systems improve educational services through better management of teacher data, student data, facilities, payment, finance, and attendance systems (Ilham & Yuniarti, 2022). In this study, students experienced service quality through academic information, attendance systems, grade information, announcements, and administrative procedures.

The simultaneous test also shows that Digital Leadership and Educational Management Information Systems jointly affect Islamic Education Service Quality, with an F-value of 94.667, a p-value of 0.000, an R-square value of 0.568, and a Q-square value of 0.351. This means that both variables explain 56.8 percent of the variance in Islamic Education Service Quality and have predictive relevance. These findings confirm that service quality in madrasahs improves when digital leadership and information systems work together. Principals must strengthen data-based decisions, integrate academic and administrative data, and improve administrative transparency. This study contributes to Islamic educational management by integrating digital leadership, information system management, and Islamic service quality in the context of urban madrasahs (Bwachele et al., 2023; Seitova et al., 2024).

D. CONCLUSION

Based on the research findings, madrasah principals' digital leadership and Educational Management Information Systems have a positive and significant effect on the quality of Islamic education services in B-accredited Madrasah Aliyah schools in the Province of Daerah Khusus Jakarta. The SEM-PLS results show that all indicators in the research variables meet the validity and reliability criteria. This indicates that the instruments used in this study are appropriate for measuring digital leadership, Educational Management Information Systems, and the quality of Islamic education services.

Madrasah principals' digital leadership has a positive and significant effect on the quality of Islamic education services. This finding shows that principals who have a digital vision, support the use of technology, build digital communication, and make data-based decisions can improve the quality of madrasah services. In the context of Islamic education, digital leadership also needs to strengthen the values of amanah, responsibility, transparency, fairness, and ethical service.

Educational Management Information Systems also have a positive and significant effect on the quality of Islamic education services. This variable has the strongest effect in the research model. This means that accurate data, fast information access, integrated reporting, and digital administrative services can increase students' satisfaction with madrasah services. A good information system helps madrasahs provide services that are faster, more orderly, more transparent, and more accountable.

Simultaneously, madrasah principals' digital leadership and Educational Management Information Systems have a significant effect on the quality of Islamic education services. The R-square value of 0.568 indicates that both variables explain 56.8 percent of the variation in Islamic education service quality. This means that madrasah service quality is not determined by leadership or technology separately, but by the synergy between digital leadership and effectively managed information systems.

This study concludes that improving the quality of Islamic education services in Madrasah Aliyah should be carried out by strengthening principals' digital leadership and optimizing Educational Management Information Systems. Madrasahs need to improve data based decision-making, integrate academic and administrative data, and strengthen service transparency for students. Through these steps, madrasahs can build Islamic education services that are more professional, responsive, accountable, and aligned with Islamic values.

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