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Analysis of the Success of the Educator and Educational Personnel Needs Analysis Management Information System Application (Simak-PTK) Using the DeLone and McLean Information System Success Model

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Abstract. The background of this study is the transition from a manual, spreadsheet-based data collection process to an integrated digital system, which was implemented to address inefficiencies in the analysis of educator and staffing needs within the South Jakarta Region II Education Office. Before the implementation of SIMAK-PTK, data processing was time-consuming, prone to delays, and lacked real-time accessibility, hindering timely decision-making and resource planning. This research aims to evaluate the success of the use of the Educator and Education Personnel Needs Analysis Management Information System Application (SIMAK-PTK) using the DeLone and McLean model. The SIMAK-PTK application is used for the collection and processing of data on the position analysis of educators and education personnel which will be used to determine how much educators and education personnel are needed in each school. This research involved 100 respondents consisting of Principals, Vice Principals for Curriculum and School Operators, analyzed using a quantitative approach using the SEM PLS method. Of the 9 hypotheses tested, 7 hypotheses were accepted and 2 hypotheses were rejected. These findings make a theoretical and practical contribution to optimizing the strategic use of technology in the field of education.

Keywords: SIMAK-PTK; Analysis of the Needs of Educators and Education Personnel; Model DeLone and McLean.

INTRODUCTION

The development of technology in this modern era is inseparable from all fields. Technology serves as a tool that helps complete tasks more effectively and efficiently (Fishman et al., 2016; Staley, 2015; Tyagi et al., 2025). Management Information Systems (MIS) form an important part of information technology, playing a key role in supporting decision-making, coordination, control, analysis, and visualization of information in organizations (Ada & Ghaffarzadeh, 2015; Biswas et al., 2024). MIS have a crucial role in technology: they assist organizations in managing information to support decision-making, increase efficiency, and encourage innovation. Without an effective MIS, organizations will struggle to compete in today's digital era (Ali, 2019; Asemi et al., 2011; Sari & Priantinah, 2019).

The Education Office is one of the work units under the auspices of the DKI Jakarta Provincial Education Office. It has the main duties and functions in the management of education in the city and regency areas in DKI Jakarta. In the Education Office itself, the Management Information System has become an integral part of supporting effective education management (Kosasih, 2012; Laudon & Laudon, 2021; Siregar & Nara, 2010).

Realizing complete and quality education is the vision of the DKI Jakarta Provincial Education Office (Dewi et al., 2018; Haryanto, 2024; Widyastuti & Atmoko, 2025). One effort to realize this vision involves managing human resources—in this case, educators and education personnel as the spearhead of education in schools. To meet the needs of educators and education personnel, a structured analysis is conducted from the school level to the office level.

Therefore, a Management Information System is needed that can accommodate the calculation and mapping processes for educators and education personnel (Çelik & Ayaz, 2022; Ojo, 2017).

Until the end of 2024, the calculation and mapping process for educators and education personnel relied on manual methods, namely distributing Google Spreadsheets to collect data from schools over a period of about one month until results were obtained in the form of Position Analysis at each school. This process is conducted by all Education Offices throughout DKI Jakarta and poses challenges, especially for the East Jakarta and South Jakarta regions, which have many schools.

Data collection for position analysis through this method is considered less effective, as the processed data cannot be used in real time and requires a long time for processing. In response to these challenges, the South Jakarta Region II Education Office has begun designing a system to accommodate the collection and processing of data on educator and education personnel needs analysis. The PTK Needs Analysis Management Information System, which began development and implementation in October 2024, is now in use.

This system enables quick data collection and processing while providing real-time data. The process of calculating and mapping educators and education personnel begins with schools filling in or updating the Analysis of Educators and Education Personnel Positions along with class clusters (rombel) in the Information Management Information System for Analysis of the Needs of Educators and Education Personnel, or SIMAK-PTK, according to the school's real conditions. After schools complete the analysis, the Education Office retrieves and processes the data, which serves as the basis for mapping existing educators and education personnel and as material for preparing recruitment budgets.

Previous studies have extensively applied the DeLone & McLean (2003) Information System Success Model to evaluate various information systems. For instance, research by Jogiyanto (2005) in the context of academic systems found that system quality and information quality significantly influence user satisfaction and net benefits. Similarly, a study by Susanto (2007) on government information systems highlighted the critical role of service quality in determining system usage and overall success. More recent research by Laudon & Laudon (2021) emphasizes that in educational settings, the success of an MIS is highly dependent on its integration with organizational processes and its ability to provide timely, accurate data for decision-making. However, specific empirical evaluation of a system designed for educator and education personnel needs analysis, particularly within the unique administrative framework of Indonesian regional education offices, remains limited.

This study aims to fill that gap by applying the validated DeLone & McLean model to assess the newly implemented SIMAK-PTK system, providing insights into its effectiveness and areas for improvement in optimizing human resource management in education. The practical benefits of this research include offering actionable recommendations to the South Jakarta Region II Education Office for enhancing the SIMAK-PTK system's functionality and user adoption. Furthermore, the findings can serve as a reference for other regional education offices in Indonesia seeking to develop or evaluate similar management information systems, thereby contributing to more efficient and data-driven educational governance at the regional level.

MATERIALS AND METHOD

This study used a quantitative approach. The research method employed was SEM-PLS (SmartPLS) with a survey approach. The study tested the influence of independent variables—namely, system quality and information quality—on dependent variables, namely usage, user satisfaction, and net benefits.

The research was conducted at the Education Office, which had implemented a management information system for managing data on educators and education personnel. The research period spanned six months, from June 2025 to December 2025.

The study subjects were parties directly involved in the management and use of the *MIS*, such as school principals, vice principals for curriculum, and school operators, totaling 100 respondents.

The research object was the management information system itself and the process of its use in analyzing the needs of educators and education personnel.

Data were collected by distributing questionnaires to respondents. Data collection through questionnaires is a technique used to gather information directly from respondents via a series of pre-designed written questions (Turban & Volonino, 2015). This method is widely used in social research, business, education, and other fields because it is practical and can reach many respondents.

Data analysis was conducted quantitatively through the following stages:

1. Data reduction: Filtering data relevant to the research focus.
2. Data presentation: Organizing data in the form of narratives, tables, and system flowcharts.
3. Conclusions: Summarizing key findings related to the effectiveness, constraints, and opportunities for *SIM* optimization.

The questionnaire was developed based on the dimensions of *MIS* success measurement by DeLone & McLean (2003) and used a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The following are the details of the questionnaire questions distributed to the respondents:

Table 1. Questionnaire questions on the dimensions of SIM success measurement

Dimensions	Questions
A. System Quality	1. The information system is easy to use.
	2. The system works quickly and efficiently.
	3. The features in the system are according to my work needs.
	4. The system rarely experiences glitches or errors.
B. Quality of Information	5. The information generated is accurate and trustworthy.
	6. The information provided is always up-to-date.
	7. Information is easy to understand and relevant for decision-making.
C. Quality of Service	8. The IT support team was responsive to my issues.
	9. The technical assistance provided is satisfactory.
	10. IT staff have adequate knowledge of the system.
D. System Use	11. I use this system regularly in my work.
	12. I feel comfortable when using this system.

Dimensions	Questions
	13. I plan to continue using this system in the future.
E. User Satisfaction	14. In general, I am satisfied with this information system.
	15. This system helps to improve my work efficiency.
	16. I feel this system is important in supporting my work.
F. Net Benefits	17. Systems help in better decision-making.
	18. The system improves my work productivity.
	19. The system has a positive impact on organizational performance.

Source: Adapted from Delone & McLean (2003)

RESULTS AND DISCUSSION

System Information Management Needs Analysis PTK (SIMAK-PTK) is a system developed to facilitate data processing. This system has been developed by IT Operators since October 2024 until now. This system functions to collect and process the availability of educators and education personnel in real time in all public schools, especially those in South Jakarta, which were previously done manually through Google Spreadsheet. This system has a level of security that is categorized as medium and has 2 levels of access, namely the admin level of the Education Office and the admin level of the school through https://sekolah-dkijakarta.my.id/public/anjab/login.php

Broadly speaking, the data collection process for the calculation and mapping process of educators and education personnel starts from filling in / updating the Position Analysis of each school in SIMAK-PTK. After the school completes the analysis, then the Educator and Education Personnel Analyst pulls data and processes the data that will be used to meet the needs of teachers and education personnel, especially in public schools (Permendikbud Ristek No. 25 of 2024 concerning Amendments to Permendikbud No. 15 of 2018 concerning the Fulfillment of the Workload of Teachers, Principals and Supervisors) and as a consideration for budget planning for the Recruitment of Educators and Education Personnel (Bryson, 2018; David, 2017).

Front View of the Management Information System for Analysis of the Needs of Educators and Education Personnel (SIMAK-PTK).

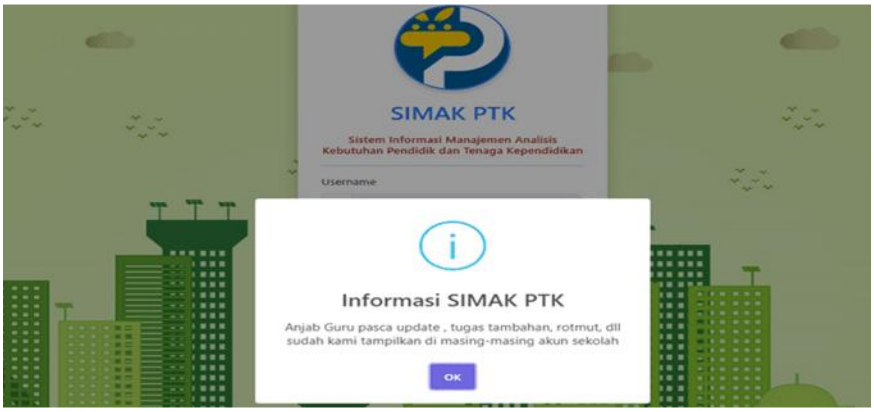

Figure 1. SIMAK-PTK Menu Display

Source : SIMAK https://sekolah-dkijakarta.my.id/public/anjab/login.php

Respondent Data

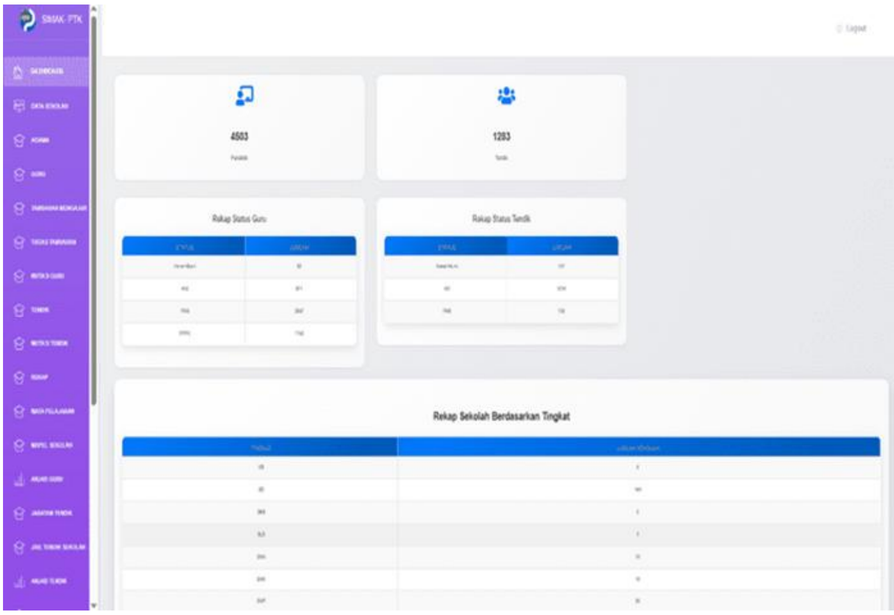

Figure 2. Distribution of Respondents by Position

Table 2. Respondent Data by Job Title

Departments	f	%
School Operator	83	83.0%
Curriculum Vitae	5	5.0%
Principal	12	12.0%
Total	100	100.0%

Source: Primary Data Analysis (2025)

Based on the table above, the majority of respondents have positions as School Operators, which are 83 people (83.0%), those who have positions as Curriculum Vice Principals are 5 people (5.0%), and those who have positions as Principals are 12 people (12.0%).

Model Analysis and Hypothesis Testing

This study conducted a model analysis using two evaluations of the assessment model, namely the outer model or measurement model and the inner model or structural model. The outer model or measurement model uses convergent validity, average variance extracted, discriminant validity, and composite reliability tests. The inner model or structural model uses the R-squared (R2) test and the path coefficient estimation test.

The outer model or measurement model uses convergent validity, discriminant validity, and composite reliability tests.

Convergent Validity

The convergent validity test is carried out to determine the validity of each relationship between the indicator and its latent constructs or variables. The reflective size or criteria in this test with a loading factor value ≥ 0.7. However, for the initial stage of research from the development of the loading value measurement scale of 0.5 to 0.6 is considered sufficient. The following are the loading factor values for each indicator:

Table 3. Convergent Validity Test Results (Outer Loading)

Variable	Indicator	Original Sample (O)	P Values	Conclusion
(X1) System Quality	X1.1	0.812	0.000	Valid
	X1.2	0.887	0.000	Valid
	X1.3	0.852	0.000	Valid
	X1.4	**0.724**	0.000	Valid
(X2) Quality of Information	X2.1	0.865	0.000	Valid
	X2.2	0.930	0.000	Valid
	X2.3	0.888	0.000	Valid
(X3) Quality of Service	X3.1	0.917	0.000	Valid
	X3.2	0.936	0.000	Valid
	X3.3	0.918	0.000	Valid
(Y1) System Usage	Y1.1	0.916	0.000	Valid
	Y1.2	0.896	0.000	Valid
	Y1.3	0.893	0.000	Valid
(Y2) User Satisfaction	Y2.1	0.903	0.000	Valid
	Y2.2	**0.947**	0.000	Valid
	Y2.3	0.932	0.000	Valid
(Z) Net Benefits	Z1	0.927	0.000	Valid
	Z2	0.915	0.000	Valid
	Z3	0.879	0.000	Valid

Source: SmartPLS Analysis Results (2025)

Based on the table above, the lowest loading factor value is 0.724 (i.e. the X1.4 indicator in the X1 variable (System Quality) and the highest loading factor value is 0.947, which is the Y2.2 indicator in the Y2 variable (User Satisfaction). Because all indicators have a loading factor value greater than 0.5, it can be concluded that all indicators are valid. Thus, it can be concluded that all indicators can explain each variable.

To evaluate the validity of the convergence, with the Average Variance Extracted (AVE) method for each construct or latent variable. An instrument is said to meet the convergent validity test if it has an Average Variance Extracted (AVE) above 0.5.

Table 4. AVE Test Results

Variable	Average variance extracted (AVE)	Critical point	Information
System quality_(X1)	0.674	0.5	Valid
Information quality_(X2)	0.800	0.5	Valid
Service quality_(X3)	0.853	0.5	Valid
Net Benefit_(Z)	0.823	0.5	Valid
Use_(Y1)	0.813	0.5	Valid
User satisfaction_(Y2)	0.861	0.5	Valid

Source: SmartPLS Analysis Results (2025)

Based on the table, it can be seen that each variable has a value Average Variance

Extracted (AVE) is more than 0.5. Thus, all indicators can be declared capable of measuring their variables.

Discriminant Validity test

The validity of the discriminator is calculated using cross loading which aims to find out whether the construct has adequate discriminators, namely with the criterion that the loading value of the intended construct must be greater than the loading value with other constructs. Thus, the indicator is declared valid in measuring the corresponding variables.

Table 5. Cross Loading Test Results

	System quality_(X1)	Information quality_(X2)	Service quality_(X3)	Use_(Y1)	User satisfaction_(Y2)	Net Benefit_(Z)	Max	Information
X1.1	0.812	0.580	0.470	0.525	0.566	0.617	0.812	Good
X1.2	0.887	0.722	0.648	0.706	0.704	0.689	0.887	Good
X1.3	0.852	0.743	0.625	0.744	0.751	0.692	0.852	Good
X1.4	0.724	0.585	0.381	0.522	0.444	0.482	0.724	Good
X2.1	0.689	0.865	0.546	0.706	0.673	0.648	0.865	Good
X2.2	0.740	0.930	0.621	0.726	0.726	0.762	0.930	Good
X2.3	0.742	0.888	0.557	0.708	0.722	0.696	0.888	Good
X3.1	0.645	0.610	0.917	0.660	0.686	0.624	0.917	Good
X3.2	0.624	0.573	0.936	0.662	0.600	0.590	0.936	Good
X3.3	0.571	0.597	0.918	0.674	0.625	0.611	0.918	Good
Y1.1	0.722	0.738	0.667	0.916	0.733	0.748	0.916	Good
Y1.2	0.753	0.722	0.695	0.896	0.717	0.654	0.896	Good
Y1.3	0.622	0.697	0.587	0.893	0.797	0.716	0.893	Good
Y2.1	0.702	0.787	0.662	0.798	0.903	0.819	0.903	Good
Y2.2	0.706	0.712	0.634	0.751	0.947	0.749	0.947	Good
Y2.3	0.732	0.695	0.623	0.759	0.932	0.791	0.932	Good
Z1	0.729	0.737	0.605	0.746	0.848	0.927	0.927	Good
Z2	0.708	0.683	0.644	0.727	0.786	0.915	0.915	Good
Z3	0.637	0.721	0.538	0.654	0.660	0.879	0.879	Good

Source: SmartPLS Analysis Results (2025)

The table above illustrates the cross loading values for each indicator against its own variables as well as against other variables. In the rightmost column is the highest cross loading value for each of these indicators, while the number in blue indicates the cross loading value for the variable. If the value in the blue cell is the same as the value in the maximum column, it means that the indicator has a good discriminant validity.

Based on the table, the indicators of each variable have a higher cross loading value against their own variables compared to other variables so that it is concluded that all indicators meet the criteria for discriminant validity.

Reliability Test

Reliability tests can be performed using Cronbach's alpha and composite reliability. The test criteria state that if the composite reliability is greater than 0.7 and Cronbach's alpha is greater than 0.6, then the construct is declared reliable.

Table 6. Reliability Test Results

Variable	Cronbach's Alpha	Composite Reliability	Information
System quality_(X1)	0.839	0.892	Reliable
Information quality_(X2)	0.875	0.923	Reliable
Service quality_(X3)	0.914	0.946	Reliable
Net Benefit_(Z)	0.892	0.933	Reliable
Use_(Y1)	0.885	0.929	Reliable
User satisfaction_(Y2)	0.919	0.949	Reliable

Source: SmartPLS Analysis Results (2025)

Based on the table, each variable produces a Cronbach's alpha value greater than 0.6 and a composite reliability value greater than 0.7. Thus, based on the calculation of the Cronbach's alpha value and the composite reliability value, all indicators are declared reliable in measuring their variables.

Coefficient of Determination (R2)

The Coefficient of Determination (R2) is used to determine the magnitude of the ability of endogenous variables to explain the diversity of exogenous variables or in other words to determine the magnitude of the contribution of exogenous variables to endogenous variables. This effect ranges from 0 to 1, with 1 representing the complete accuracy of the prediction. With prediction accuracy rates of 0.67 (strong), 0.33 (moderate), and 0.19 (weak). Here are the results of the R2 analysis:

Table 7. Result Coefficient of Determination (R2)

R-square	
Net Benefit (Z)	0.741
Use (Y1)	0.729
User satisfaction (Y2)	0.753

Source: SmartPLS Analysis Results (2025)

The table shows that:

1. The R2 value of Y1 is 0.729 meaning that Y1 is influenced by X1, X2, and X3 by 72.9% (included in the strong category) while the rest is influenced by other factors that were not studied in this study.
2. The R2 value of Y2 is 0.753 meaning that Y2 is influenced by X1, X2, X3, and Y1 by 75.3% (included in the strong category) while the rest is influenced by other factors that were not studied in this study.
3. The R2 Z value is 0.741, meaning that Z is influenced by Y1 and Y2 by 74.1% (included in the strong category) while the rest is influenced by other factors that were not studied in this study.

Q2 (predictive relevance)

Q-square can be seen in the results of the blindfolding calculation in the construct cross validated redundancy section. The results of the calculation can be seen in the following table:

Table 8. Q-square

Variable	Q² (=1-SSE/SSO)
Information quality (X2)	0
Net Benefit (Z)	0.598
Service quality (X3)	0
System quality (X1)	0
Use (Y1)	0.581
User satisfaction (Y2)	0.630

Source: SmartPLS Analysis Results (2025)

From the calculation results in the table above, the Q2 values for variables Z, Y1, and Y2 are 0.598, 0.581, and 0.630 respectively, which means that all these variables have good prediction relevance values. Since the Q2 value is more than zero, the model already meets the predictive relevance where the model has been well reconstructed.

***Hypothesis Bootstrapping Testing* (*Path Analysis*)**

Hypothesis testing is used to test whether exogenous variables have an influence on endogenous variables. The results of the significance and model tests can be found out through the following figures and tables.

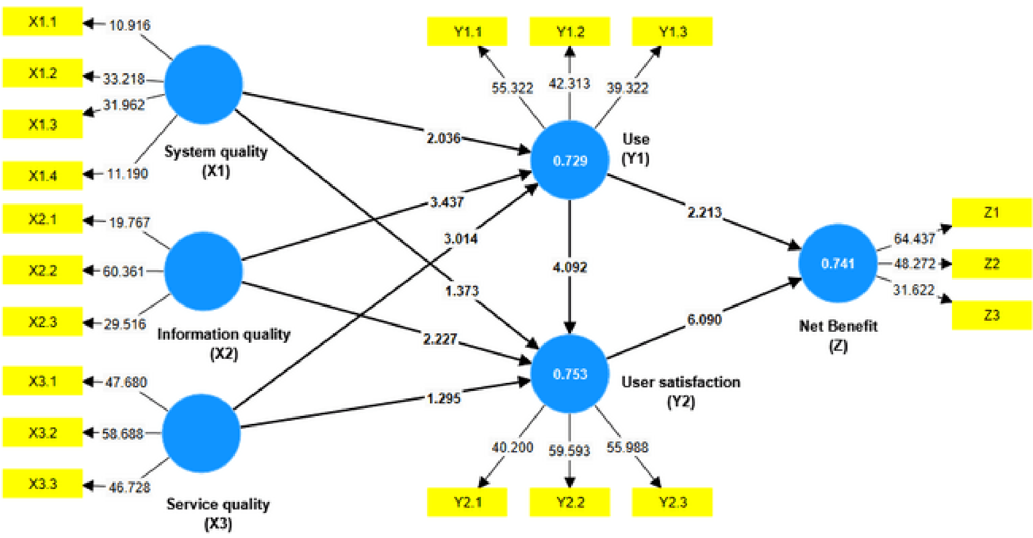

Figure 3. Inner Model Results Picture

Source: SmartPLS Analysis Results (2025)

The hypotheses tested are:

H1 : System quality affects Use in terms of success rate in SIMAK applications (X1 --> Y1)

H2 : System quality affects User satisfaction in terms of success rate in the SIMAK application (X1 --> Y2)

H3 : Information quality affects Use in terms of success rate in SIMAK application (X2 --> Y1)

H4 : Information quality affects User satisfaction in terms of success rate in the SIMAK application (X2 --> Y2)

H5 : Service quality affects Use in terms of success rate in SIMAK applications (X3 --> Y1)
H6 : Service quality affects User satisfaction in terms of success rate in the SIMAK application (X3 --> Y2)
H7 : Use affects User satisfaction in terms of success rate on SIMAK applications (Y1 --> Y2)
H8 : Use affects the Net benefit in terms of the success rate of the SIMAK application (Y1 --> Z)
H9 : User satisfaction affects Net benefits in terms of success rate on the SIMAK application (Y2 --> Z)

The test criteria state that if the T-Value ≥ T-table (1.96) or the P-Value value < significant alpha 5% or 0.05, then it is stated that there is a significant influence of exogenous variables on endogenous variables.

Here are the results obtained:

Table 9. Path Coefficient Value

Hypothesis	Relationship	Original sample (O)	T statistics (|O/STDEV|)	P values
H1	System quality (X1) -> Use (Y1)	0.254	2.036	0.042
H2	System quality (X1) -> User satisfaction (Y2)	0.166	1.373	0.170
H3	Information quality (X2) -> Use (Y1)	0.404	3.437	0.001
H4	Information quality (X2) -> User satisfaction (Y2)	0.241	2.227	0.026
H5	Service quality (X3) -> Use (Y1)	0.292	3.014	0.003
H6	Service quality (X3) -> User satisfaction (Y2)	0.120	1.295	0.195
H7	Use (Y1) -> User satisfaction (Y2)	0.424	4.092	0.000
H8	Use (Y1) -> Net Benefit (Z)	0.252	2.213	0.027
H9	User satisfaction (Y2) -> Net Benefit (Z)	0.640	6.090	0.000

Source: SmartPLS Analysis Results (2025)

Based on the table, it can be explained as follows:

H1 : System quality affects Use in terms of success rate in SIMAK applications (X1 --> Y1)

In the test results listed in the table above, the value of the coefficient of the X1 path to Y1 is 0.254 (positive direction), the T statistics are 2.036, and the p-value is 0.042. The test results showed that the T value of statistics > 1.96 and the p-value < 0.05. So H1 is accepted, meaning that System quality affects Use in terms of the success rate of the SIMAK application in a positive direction.

H2 : System quality affects User satisfaction in terms of success rate in the SIMAK application (X1 --> Y2)

In the test results listed in the table above, the value of the coefficient of the X1 line to Y2 is 0.166 (positive direction), the T statistics are 1.373, and the p-value is 0.170. The results of the test showed that the T value of statistics < 1.96 and the p-value > 0.05. So H2 is rejected, meaning that System quality has no effect on User satisfaction in terms of the success rate of the SIMAK application in a positive direction.

H3 : Information quality affects Use in terms of success rate in SIMAK application (X2 --> Y1)

In the test results listed in the table above, the value of the coefficient of the X2 path to Y1 is 0.404 (positive direction), the T statistics are 3.437, and the p-value is 0.001. The test results showed that the T value of statistics > 1.96 and the p-value < 0.05. So H3 is accepted, meaning that Information quality affects Use in terms of the success rate of the SIMAK application in a positive direction.

H4 : Information quality affects User satisfaction in terms of success rate in the SIMAK application (X2 --> Y2)

In the test results listed in the table above, the value of the coefficient of the X2 line to Y2 is 0.241 (positive direction), the T statistics are 2.227, and the p-value is 0.026. The test results showed that the T value of statistics > 1.96 and the p-value < 0.05. So H4 is accepted, which means that Information quality affects user satisfaction in terms of the level of success on the SIMAK application in a positive direction.

H5 : Service quality affects Use in terms of success rate in SIMAK applications (X3 --> Y1)

In the test results listed in the table above, the value of the coefficient of the X3 line to Y1 is 0.292 (positive direction), the T statistics are 3.014, and the p-value is 0.003. The test results showed that the T value of statistics > 1.96 and the p-value < 0.05. So H5 is accepted, which means that Service quality affects Use in terms of the level of success in the SIMAK application in a positive direction.

H6 : Service quality affects User satisfaction in terms of success rate in the SIMAK application (X3 --> Y2)

In the test results listed in the table above, the value of the X3 line coefficient to Y2 is 0.120 (positive direction), T statistics is 1.295, and the p-value is 0.195. The results of the test showed that the T value of statistics < 1.96 and the p-value > 0.05. So H6 was rejected, meaning that Service quality has no effect on User satisfaction in terms of the level of success on the SIMAK application in a positive direction.

H7 : Use affects User satisfaction in terms of success rate on SIMAK applications (Y1 --> Y2)

In the test results listed in the table above, the value of the Y1 line coefficient to Y2 is 0.424 (positive direction), T statistics is 4.092, and the p-value is 0.000. The test results showed that the T value of statistics > 1.96 and the p-value < 0.05. So H7 is accepted, meaning that Use affects User satisfaction in terms of the level of success in the SIMAK application in a positive direction.

H8 : Use affects the Net benefit in terms of the success rate of the SIMAK application (Y1 --> Z)

In the test results listed in the table above, the value of the Y1 path coefficient to Z is 0.252 (positive direction), T statistics is 2.213, and the p-value is 0.027. The test results showed that the T value of statistics > 1.96 and the p-value < 0.05. So H8 is accepted, meaning that Use influences the Net benefit in terms of the success rate of the SIMAK application in a positive direction.

H9 : User satisfaction affects Net benefits in terms of success rate on the SIMAK application (Y2 --> Z)

In the test results listed in the table above, the value of the Y2 path coefficient to Z is 0.640 (positive direction), T statistics is 6.090, and the p-value is 0.000. The test results showed that the T value of statistics > 1.96 and the p-value < 0.05. So H9 is accepted, meaning that User satisfaction affects the Net benefit in terms of the level of success on the SIMAK application in a positive direction.

CONCLUSION

The research on the SIMAK-PTK (Management Information System for Analysis of the Needs of Educators and Education Personnel) implementation at the South Jakarta Region II Education Office revealed that system quality positively influenced SIMAK application usage but not user satisfaction; information quality positively affected both usage and satisfaction; and service quality positively impacted usage but not satisfaction. Furthermore, SIMAK usage positively influenced user satisfaction and net benefits, while user satisfaction also drove net benefits. To enhance overall success, improvements in system quality and service quality—such as reliability, response time, and user support—are recommended, alongside continuous user training and periodic feedback-based evaluations. For future research, longitudinal studies could track these relationships over multiple years to assess long-term sustainability and the impact of proposed enhancements amid evolving educational policies in Indonesian regional offices.

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