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The Effect Of The Implementation Of The Electronic Absence System On The Performance Of Civil Servants With Work Discipline As An Intervening Variable At The Metro City Transportation Service

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Abstract

This study aims to examine the effect of the implementation of an electronic attendance system on the performance of civil servants, with work discipline serving as an intervening variable at the Metro City Transportation Agency. The study was motivated by the persistence of attendance and disciplinary issues despite the implementation of an electronic attendance system. A quantitative approach with an explanatory research design was employed. The study population consisted of 44 civil servants working at the Metro City Transportation Agency. A saturated sampling technique was applied, whereby all members of the population were included as respondents. Data were collected through questionnaires and analyzed using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach with SmartPLS software. The findings reveal that the electronic attendance system has a positive and significant effect on work discipline (β = 0.701; t = 7.030; p < 0.05). Work discipline also has a positive and significant effect on employee performance (β = 0.618; t = 4.072; p < 0.05). Furthermore, the electronic attendance system directly exerts a positive and significant effect on employee performance (β = 0.316; t = 1.986; p < 0.05). The indirect effect analysis demonstrates that work discipline significantly mediates the relationship between the electronic attendance system and employee performance, with an indirect effect coefficient of 0.433 (t = 3.913; p < 0.05). These findings indicate that optimizing the implementation of an electronic attendance system, supported by stronger work discipline, can serve as an effective strategy for improving employee performance while enhancing the quality of public services at the Metro City Transportation Agency.

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Keywords: Electronic attendance system, work discipline, employee performance, PLS-SEM, Metro City Transportation Agency

INTRODUCTION

The rapid advancement of information technology has significantly transformed public administration, particularly in the management of human resources. Digital transformation has become one of the government's primary strategies for establishing governance that is more effective, efficient, transparent, and accountable (Sabarguna, 2018). Various technology-based innovations have been introduced to improve the quality of public services while modernizing administrative processes (Dumbiri & Permana, 2021). One of these innovations is the implementation of an electronic attendance system, which replaces conventional manual attendance recording. This system is designed to produce more accurate, objective, and automatically documented attendance records, thereby minimizing the possibility of data manipulation (Chaerowati & Ibrahim, 2019). Beyond serving as a tool for recording employee attendance, the electronic attendance system is also expected to function as a managerial control mechanism that enhances work discipline and ultimately improves employee performance (Ahmad et al., 2020).

Within public sector organizations, electronic attendance systems play a strategic role in monitoring employee discipline. Digitally recorded attendance data enable managers to supervise employees' compliance with working hours and provide objective information for performance evaluation. Technologies such as fingerprint recognition, facial recognition, Global Positioning System (GPS), and mobile-based applications have been widely adopted to facilitate real-time attendance monitoring. The implementation of these technologies is expected to improve transparency, strengthen supervision, and provide reliable information to support human resource management decisions (Andriana et al., 2019).

The successful implementation of technology within an organization depends not only on the quality of the information system but also on employees' willingness to utilize the technology effectively. From a human resource management perspective, employees represent valuable organizational assets that determine the achievement of organizational objectives (Xiang, 2018). Consequently, the implementation of an electronic attendance system should be accompanied by employees' increased awareness of organizational regulations, punctuality, and professional responsibility. Therefore, the effectiveness of the electronic attendance system largely depends on employees' disciplinary behavior.

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The Metro City Transportation Department is one of the government agencies that has implemented an electronic attendance system to improve employee attendance management. This policy is intended to strengthen work discipline, improve attendance monitoring, and support better public service delivery. However, empirical evidence indicates that the implementation of the system has not yet fully achieved its intended objectives. Attendance records from January to March 2026 reveal that the average attendance rate remained at only 77%, indicating that employee discipline has not reached the expected level.

This condition is further reflected in the high number of disciplinary violations recorded during the observation period. Frequent violations include late arrivals, absence from morning assemblies, leaving work before official working hours, and unexplained absences. These findings suggest that the implementation of the electronic attendance system alone has not been sufficient to encourage employees' compliance with organizational regulations. In other words, technological implementation does not automatically lead to behavioral change without the support of other factors influencing work discipline.

Work discipline is widely recognized as a fundamental aspect of human resource management because it reflects employees' compliance with organizational rules and procedures (Kusuma et al., 2019). Employees with a high level of discipline tend to demonstrate greater responsibility, make better use of working hours, and complete assigned tasks according to established standards. Conversely, poor work discipline may reduce productivity, service quality, and organizational effectiveness (Turmudhi & Ristianawati, 2023). Therefore, work discipline is expected to play an intervening role in explaining the relationship between the implementation of electronic attendance systems and employee performance (Abdul Rahman & Muhammad Yusuf, 2021).

Previous studies have reported that electronic attendance systems positively influence both work discipline and employee performance (Liang et al., 2018). Nevertheless, empirical findings remain inconsistent regarding the mechanism through which these variables are related, particularly the mediating role of work discipline. Furthermore, studies investigating electronic attendance systems within local government institutions, especially the Metro City Transportation Department, remain limited. This situation indicates the existence of a research gap that warrants further empirical investigation.

Based on these empirical phenomena and the identified research gap, this study aims to examine the effect of the electronic attendance system on employee performance by considering work discipline as an intervening variable at the Metro City Transportation Department. The

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findings are expected to contribute to the development of human resource management literature, particularly in the context of digital human resource administration, while also providing practical recommendations for local governments in improving attendance management policies to enhance the quality of public services.

LITERATUR REVIEW

Electronic Attendance System

An electronic attendance system is one form of information technology utilization used by organizations to record employee attendance automatically, accurately, and in an integrated manner (Liang et al., 2018). The implementation of this system aims to replace manual attendance methods, which are considered to have several weaknesses, such as a high potential for recording errors, data manipulation, and ineffective attendance monitoring. Through technologies such as fingerprint scanners, facial recognition, RFID, and mobile-based applications, organizations are able to obtain real-time attendance data, thereby facilitating the monitoring and evaluation of employee discipline. Therefore, an electronic attendance system functions not only as a tool for recording attendance but also as a management control instrument that enhances the effectiveness of human resource management (Aceto et al., 2018).

According to Chaerowati & Ibrahim, (2019) the acceptance of an information technology system is influenced by two main factors, namely *perceived ease of use* and *perceived usefulness*. This concept explains that employees are more likely to accept an electronic attendance system if it is easy to operate and provides tangible benefits in carrying out their work. Sutarman et al., (2023) argue that the success of an information system is determined by system quality, information quality, service quality, system use, user satisfaction, and the net benefits generated. Therefore, the successful implementation of an electronic attendance system depends not only on the sophistication of the technology but also on the organization's ability to provide a reliable, user-friendly system that meets employees' needs (Taftania et al., 2020).

Based on these perspectives, it can be concluded that an electronic attendance system is a technology-based information system designed to record, manage, and monitor employee attendance effectively, efficiently, and objectively. The implementation of this system enhances transparency in personnel administration, reduces attendance recording errors, accelerates the preparation of attendance reports, and serves as a basis for evaluating employee discipline and performance. Consequently, the more effectively an organization implements an electronic attendance system, the greater its contribution to improving employee discipline and overall

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productivity.

Work Discipline

Work discipline is one of the essential aspects of human resource management that reflects employees' willingness to comply with all organizational rules, standards, and work procedures. Alamsyah et al., (2024) work discipline is the awareness and willingness of individuals to obey all organizational regulations and prevailing social norms. Discipline is not limited to compliance with working hours but also includes responsibility in completing assigned tasks, maintaining professional ethics, and performing duties in accordance with organizational policies. Good work discipline enables organizations to establish an orderly, productive, and goal-oriented work environment (Dunan et al., 2026).

Faris et al., (2022) explains that work discipline represents employees' attitudes of respect and obedience toward organizational regulations as demonstrated through their daily work behavior. Employees with a high level of discipline exhibit responsibility, punctuality, adherence to work procedures, and consistency in completing their duties. Conversely, poor discipline may result in work delays, declining service quality, increased rule violations, and reduced organizational effectiveness. Therefore, work discipline is considered one of the primary indicators used by organizations to evaluate employee professionalism (Karawang et al., 2023).

Based on these definitions, work discipline can be understood as employee behavior that demonstrates compliance with organizational regulations based on both personal awareness and managerial supervision (Dewi et al., 2023). Work discipline is influenced not only by individual characteristics but also by leadership, supervisory systems, compensation, organizational culture, and the implementation of administrative technologies such as electronic attendance systems. Therefore, the higher the level of employee work discipline, the greater the organization's opportunity to improve work effectiveness, service quality, and the sustainable achievement of organizational goals (Suriansyah, 2022).

Employee Perfomance

Employee performance refers to the work outcomes achieved by an individual in carrying out assigned duties and responsibilities in accordance with established organizational standards. According to (Kuswati, (2020) performance is the quality and quantity of work accomplished by employees in performing their responsibilities. Performance assessment is not solely based on the amount of work completed but also considers work quality, timeliness, teamwork, and

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responsibility toward assigned tasks. Therefore, employee performance is regarded as one of the primary indicators of organizational success in managing its human resources.

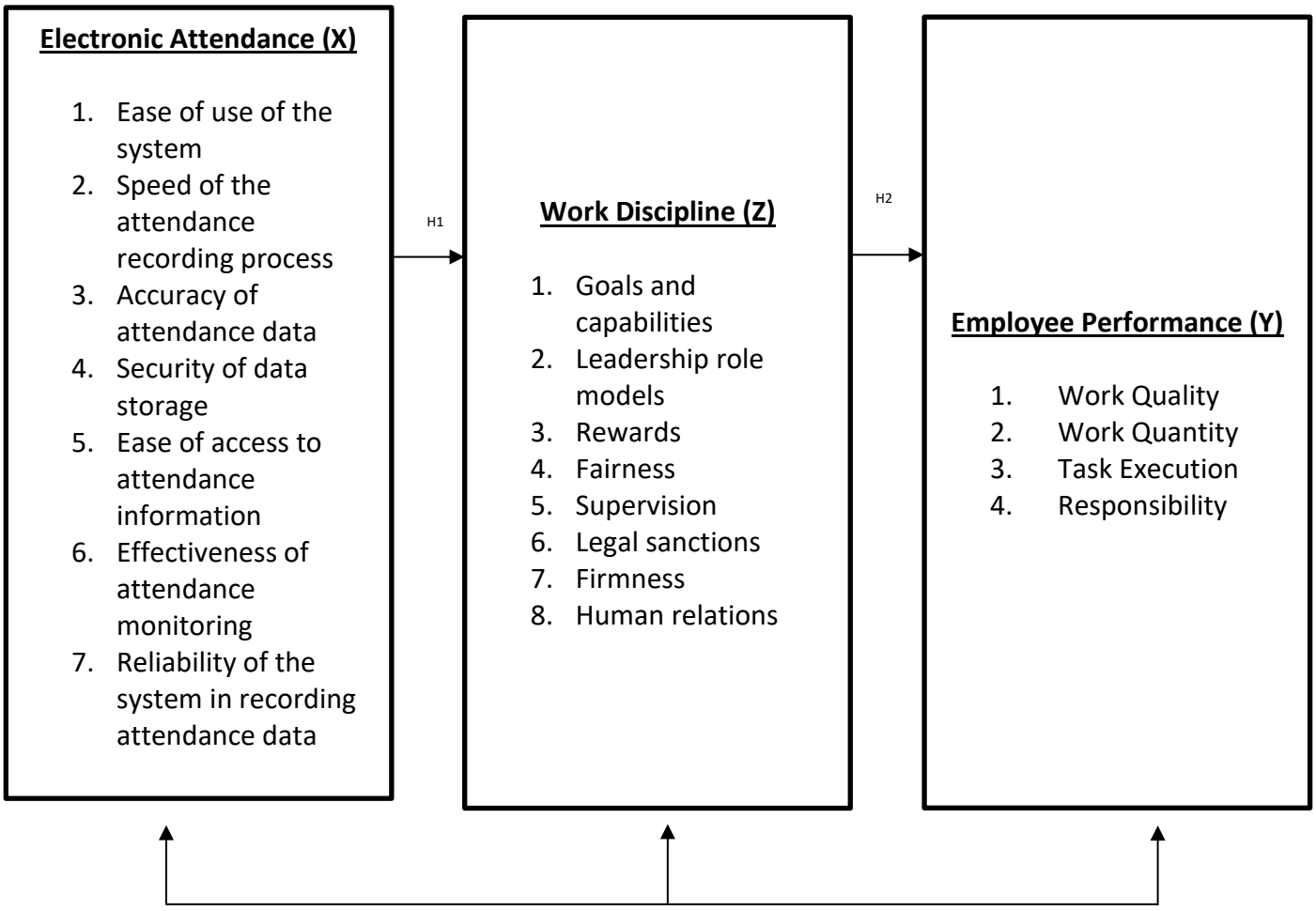
According to Rakatama & Chaerudin, (2021)employee performance is the result of work implementation evaluated based on quality, quantity, effectiveness, and efficiency in carrying out organizational functions. Employee performance is influenced by various factors, including ability, motivation, work discipline, the work environment, leadership, and information technology support. In the digital era, the implementation of human resource information systems, such as electronic attendance systems, contributes to improving accountability, punctuality, and supervision of employee performance, thereby positively influencing overall organizational performance (Emmanuel & Nwuzor, 2021).

Based on the above perspectives, employee performance can be defined as the level of success achieved by individuals in carrying out their work in accordance with organizational targets, standards, and responsibilities. High employee performance is reflected in the ability to produce high-quality work, complete tasks on time, demonstrate responsibility, and contribute to the achievement of organizational objectives (Dari, 2020). Therefore, organizations should continuously improve factors that influence employee performance, including the effective implementation of electronic attendance systems and the development of strong work discipline, to maximize employee productivity and organizational effectiveness (Jaafar et al., 2017).

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Framework



Hypothesis

H1: Electronic attendance has a positive and significant effect on employee work discipline at the Metro City Transportation Agency.

H2: Work discipline has a positive and significant effect on employee performance at the Metro City Transportation Agency.

H3: Electronic attendance has a positive and significant effect on employee performance at the Metro City Transportation Agency.

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H4: Electronic attendance has a positive and significant effect on employee performance through work discipline as an intervening variable at the Metro City Transportation Agency.

RESEARCH METHODS

This study employed a quantitative approach using a survey method with a verification design to examine the causal relationships among the research variables (Dhall, 2019). A quantitative approach was selected because it enables research phenomena to be measured objectively through numerical data, which are subsequently analyzed using statistical techniques. The study was conducted among Civil Servants (CSs) at the Metro City Transportation Agency using a census method, whereby all members of the population were included as research respondents. This approach was adopted because the population size was relatively small, allowing the entire population to be observed and providing a comprehensive representation of the research object.

The study involved three main constructs: the implementation of an electronic attendance system as the independent variable, work discipline as the intervening variable, and employee performance as the dependent variable. The electronic attendance system was measured through indicators of ease of use, recording speed, data accuracy, data security, accessibility of attendance information, effectiveness of attendance monitoring, and system reliability. Work discipline was assessed using indicators of goals and competence, leadership role model, compensation, fairness, supervision, sanctions, assertiveness, and human relations, while employee performance was measured based on work quality, work quantity, task execution, and responsibility. All indicators were assessed using a five-point Likert scale ranging from strongly disagree to strongly agree.

Primary data were collected through a structured questionnaire developed from the indicators of each research variable. The collected data were analyzed using descriptive statistics to describe respondent characteristics and research responses, followed by inferential statistical analysis to test the proposed hypotheses.

The proposed research model was analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS 4 software. This analytical technique was selected because it can simultaneously estimate relationships among latent variables, including both direct and indirect effects through a mediating variable. The analysis consisted of evaluating the measurement model (outer model) by examining convergent validity, discriminant validity,

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Composite Reliability, and Cronbach's Alpha, followed by evaluation of the structural model (inner model) through the coefficient of determination (R^2), effect size (f^2), path coefficients, and bootstrapping procedures at a 5% significance level to test the proposed hypotheses.

RESULT AND DISCUCCION

Inferential Analysis

Inferential analysis was employed to test the research hypotheses and examine the relationships among the study variables, allowing the findings obtained from the sample to be generalized to the target population. Unlike descriptive analysis, which merely describes the characteristics of the collected data, inferential analysis provides empirical evidence regarding the relationships and effects among variables through statistical testing. In this study, data were analyzed using SmartPLS version 4 based on the Structural Equation Modeling–Partial Least Squares (SEM-PLS) approach. SEM-PLS was selected because it is capable of analyzing complex causal relationships, estimating both direct and indirect effects through an intervening variable, and handling research models involving latent constructs. The analysis consisted of two stages: evaluation of the measurement model (outer model) to assess construct validity and reliability, followed by evaluation of the structural model (inner model) to examine the coefficient of determination (R^2), path coefficients, and the significance of relationships among variables using the bootstrapping procedure.

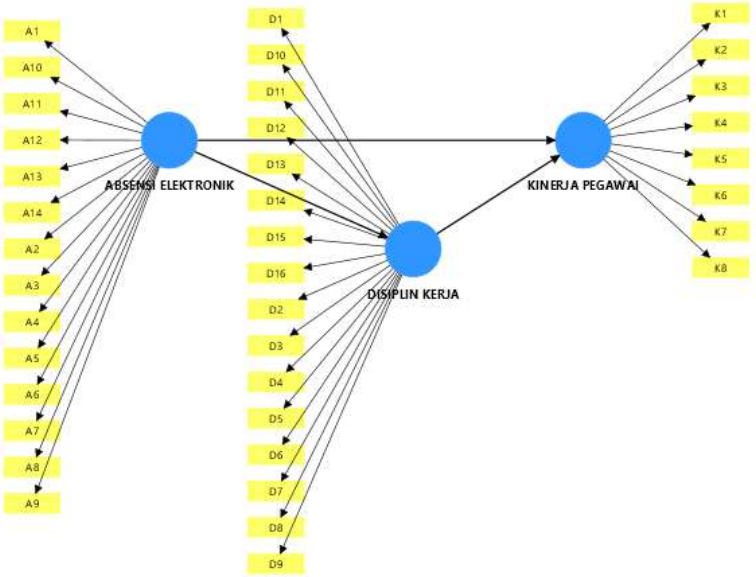


Figure 2 Latent Variable Model of Research

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Figure 2 presents the proposed research model, illustrating the relationships among Electronic Attendance, Work Discipline, and Employee Performance. In this model, Electronic Attendance serves as the independent variable, Work Discipline acts as the mediating variable, and Employee Performance is the dependent variable. The constructs are measured using 14, 16, and 8 indicators, respectively, which represent the manifest variables in the SEM-PLS analysis. The model hypothesizes that Electronic Attendance has direct effects on both Work Discipline and Employee Performance. Furthermore, Work Discipline directly influences Employee Performance and mediates the relationship between Electronic Attendance and Employee Performance, indicating both direct and indirect effects of Electronic Attendance on employee performance.

Convergent Validity

Table 1. Outer Loading Results of Convergent Validity Test Stage 1

INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFORMANCE	DESCRIPTION
A1	0.519			Unvalid
A2	0.629			Unvalid
A3	0.646			Unvalid
A4	0.632			Unvalid
A5	0.536			Unvalid
A6	0.569			Unvalid
A7	0.810			Valid
A8	0.795			Valid
A9	0.764			Valid
A10	0.781			Valid
A11	0.651			Unvalid
A12	0.528			Unvalid
A13	0.663			Unvalid
A14	0.664			Unvalid
D1		0.632		Unvalid
D2		0.852		Valid
D3		0.888		Valid

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INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFORMANCE	DESCRIPTION
D4		0.777		Valid
D5		0.825		Valid
D6		0.784		Valid
D7		0.858		Valid
D8		0.804		Valid
D9		0.813		Valid
D10		0.810		Valid
D11		0.753		Valid
D12		0.827		Valid
D13		0.813		Valid
D14		0.817		Valid
D15		0.703		Valid
D16		0.768		Valid
K1			0.869	Valid
K2			0.884	Valid
K3			0.875	Valid
K4			0.892	Valid
K5			0.877	Valid
K6			0.803	Valid
K7			0.831	Valid
K8			0.844	Valid

Source: Processed data, 2026

Based on the outer model evaluation using PLS-SEM, convergent validity was assessed through the loading factor, with a threshold of ≥ 0.70. The initial results showed that ten indicators of the Electronic Attendance construct and one indicator of the Work Discipline construct (D1 = 0.632) did not meet this criterion. Therefore, indicators with loading factor values below 0.70 were removed to improve the quality of the measurement model. After re-estimation, the revised model produced improved loading factor values, as presented in Table 16, providing a valid basis for evaluating the construct validity of the research model.

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Table 2. Outer Loading Results of Convergent Validity Test Stage 2

INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFOMANCE	DESCRIPTION
A7	0.822			Valid
A8	0.882			Valid
A9	0.769			Valid
A10	0.863			Valid
D2		0.848		Valid
D3		0.889		Valid
D4		0.771		Valid
D5		0.817		Valid
D6		0.783		Valid
D7		0.867		Valid
D8		0.811		Valid
D9		0.811		Valid
D10		0.804		Valid
D11		0.760		Valid
D12		0.835		Valid
D13		0.823		Valid
D14		0.825		Valid
D15		0.699		Unvalid
D16		0.770		Valid
K1			0.869	Valid
K2			0.884	Valid
K3			0.874	Valid
K4			0.892	Valid
K5			0.877	Valid
K6			0.803	Valid
K7			0.831	Valid
K8			0.844	Valid

Source: SmartPLS output, 2026

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The second-stage **loading factor** analysis showed that indicator D15 of the Work Discipline construct had a loading value of 0.699, which was below the recommended threshold of 0.70. Therefore, this indicator was removed, and the model was re-evaluated in the third stage. The results of the third-stage loading factor analysis are presented in Table.

Table 3. Outer Loading Results of Convergent Validity Test Stage 3

INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFOMANCE	DESCRIPTION
A7	0.822			Valid
A8	0.882			Valid
A9	0.768			Valid
A10	0.864			Valid
D2		0.856		Valid
D3		0.884		Valid
D4		0.768		Valid
D5		0.818		Valid
D6		0.789		Valid
D7		0.865		Valid
D8		0.802		Valid
D9		0.802		Valid
D10		0.805		Valid
D11		0.775		Valid
D12		0.842		Valid
D13		0.828		Valid
D14		0.827		Valid
D16		0.768		Valid
K1			0.868	Valid
K2			0.884	Valid
K3			0.874	Valid
K4			0.892	Valid
K5			0.878	Valid
K6			0.803	Valid

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INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFOMANCE	DESCRIPTION
K7			0.832	Valid
K8			0.845	Valid

Source: SmartPLS output, 2026

The output value of the loading factor of this third stage of testing is that all the variable statements for electronic attendance, work discipline and employee performance have a loading factor value of more than 0.7 so that all are said to be valid. This indicates that the indicators/statements used are successful in measuring the correlation between the indicator/statement scores and the constructs/variables, thus supporting the construct validity of the measurement model.

Average Variance Extracted (AVE)

Table 4. AVE Results of Convergent Validity Test

Variable	*Average Variance Extracted* (AVE)	Description
Electronic Attendance	0.698	Valid
Work Discipline	0.668	Valid
Employee Perfomance	0.739	Valid

Source: SmartPLS output, 2026

The convergent validity assessment showed that all research constructs achieved Average Variance Extracted (AVE) values above the recommended threshold of 0.50. The AVE values for Electronic Attendance, Work Discipline, and Employee Performance were 0.698, 0.668, and 0.739, respectively. These results indicate that each construct explains more than 50% of the variance in its indicators, thereby satisfying the criterion for convergent validity. Therefore, the measurement model (outer model) is considered valid and appropriate for subsequent analysis.

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Discriminant Validity

1. Cross Loading

Table 5. Cross Loading Results of Discriminant Validity Test Stage 1

INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFOMANCE	DESCRIPTION
A7	**0.822**	0.620	0.622	Valid
A8	**0.882**	0.667	0.704	Valid
A9	**0.768**	0.578	0.599	Valid
A10	**0.864**	0.531	0.561	Valid
D2	0.617	**0.856**	0.801	Valid
D3	0.537	**0.884**	0.749	Valid
D4	0.460	**0.768**	0.710	Valid
D5	0.451	**0.818**	0.632	Valid
D6	0.600	**0.789**	0.718	Valid
D7	0.669	**0.865**	0.684	Valid
D8	0.520	**0.802**	0.606	Valid
D9	0.467	**0.802**	0.686	Valid
D10	0.719	**0.805**	0.783	Valid
D11	0.589	**0.775**	0.575	Valid
D12	0.611	**0.842**	0.677	Valid
D13	0.549	**0.828**	0.591	Valid
D14	0.628	**0.827**	0.704	Valid
D16	0.728	**0.768**	0.780	Unvalid
K1	0.644	0.712	**0.868**	Valid
K2	0.603	0.733	**0.884**	Valid
K3	0.569	0.752	**0.874**	Valid
K4	0.647	0.756	**0.892**	Valid
K5	0.697	0.780	**0.878**	Valid
K6	0.598	0.708	**0.803**	Valid
K7	0.713	0.706	**0.832**	Valid
K8	0.674	0.731	**0.845**	Valid

Source: SmartPLS output, 2026

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The cross-loading results indicate that most indicators of the Electronic Attendance, Work Discipline, and Employee Performance constructs satisfied the discriminant validity criterion by exhibiting higher correlations with their respective constructs than with other constructs. This finding confirms that the indicators adequately represent their corresponding latent constructs. However, indicator D16 of the Work Discipline construct showed a cross-loading value of 0.780, indicating that it did not fully meet the discriminant validity criterion. Consequently, indicator D16 was removed, and the model was re-estimated to improve the validity and reliability of the measurement model. The subsequent cross-loading assessment demonstrated that the remaining indicators satisfied the discriminant validity requirements.

Table 6. Cross Loading Results of Discriminant Validity Test Stage 2

INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFOMANCE	DESCRIPTION
A7	**0.823**	0.606	0.622	Valid
A8	**0.883**	0.660	0.704	Valid
A9	**0.767**	0.549	0.599	Valid
A10	**0.864**	0.507	0.561	Valid
D2	0.617	**0.854**	0.801	Valid
D3	0.536	**0.883**	0.749	Valid
D4	0.460	**0.769**	0.710	Valid
D5	0.451	**0.824**	0.632	Valid
D6	0.601	**0.800**	0.718	Valid
D7	0.669	**0.862**	0.684	Valid
D8	0.521	**0.805**	0.606	Valid
D9	0.468	**0.808**	0.686	Valid
D10	0.719	**0.799**	0.783	Valid
D11	0.589	**0.780**	0.575	Valid
D12	0.611	**0.850**	0.677	Valid
D13	0.549	**0.835**	0.591	Valid
D14	0.629	**0.823**	0.704	Valid
K1	0.644	0.698	**0.868**	Valid
K2	0.604	0.723	**0.884**	Valid

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INDICATOR	ELECTRONIC ATTENDANCE	WORK DISCIPLINE	EMPLOYEE PERFOMANCE	DESCRIPTION
K3	0.570	0.747	**0.874**	Valid
K4	0.647	0.741	**0.891**	Valid
K5	0.697	0.755	**0.877**	Valid
K6	0.599	0.703	**0.804**	Valid
K7	0.713	0.688	**0.832**	Valid
K8	0.674	0.716	**0.845**	Valid

Source: SmartPLS output, 2026

The *cross-loading* results indicate that all indicators of Electronic Attendance, Work Discipline, and Employee Performance exhibit higher correlations with their respective constructs than with other constructs. These findings confirm that the measurement model satisfies the *discriminant validity* criterion, indicating that each indicator accurately measures its intended construct without overlapping with other constructs. Furthermore, the results of both *convergent validity* and *discriminant validity* assessments demonstrate that all indicators meet the required validity criteria. Therefore, the measurement model can be considered valid and suitable for further analysis, as it accurately and reliably represents each latent construct.

2. Heterotrait-Monotrait Ratio (HTMT)

Table 7. Heterotrait-Monotrait Ratio (HTMT) Results

Indicator	Electronic Attendance	Work Discipline	Employee Perfomance
Electronic Attendance			
Work Discipline	0.760		
Employee Perfomance	0.826	0.873	

Source: SmartPLS output, 2026

As shown in Table 21, the HTMT values are 0.760 for the relationship between Electronic Attendance and Work Discipline, 0.826 for Electronic Attendance and Employee Performance, and 0.873 for Work Discipline and Employee Performance. All HTMT values are below the recommended threshold of 0.90, indicating that the measurement model satisfies the criterion

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for *discriminant validity* (Hair et al., 2022). These findings demonstrate that each construct is conceptually and empirically distinct, with no substantial overlap among the measured variables.

The HTMT value of 0.760 indicates that Electronic Attendance and Work Discipline are closely related while remaining distinct constructs. Likewise, the HTMT value of 0.826 confirms adequate discriminant validity between Electronic Attendance and Employee Performance. The highest HTMT value, 0.873, was observed between Work Discipline and Employee Performance; however, it remains below the recommended threshold, indicating that these constructs, although strongly related, are still empirically distinguishable.

Overall, the HTMT results confirm that the measurement model demonstrates satisfactory discriminant validity, indicating that each indicator accurately represents its intended construct. Therefore, the *outer model* is considered valid and appropriate for proceeding to the evaluation of the *inner model* and hypothesis testing.

Contruct Reliability

1. Composite Reliability

Table 8. Composite Reliability Value

Variable	Composite reliability	Description
Electronic Attendance	0.902	Reliable
Work Discipline	0.965	Reliable
Employee Perfomance	0.958	Reliable

Source: SmartPLS output, 2026

The *composite reliability* results indicate that all constructs demonstrate high reliability, with values of 0.902 for Electronic Attendance, 0.965 for Work Discipline, and 0.958 for Employee Performance. Since all values exceed the recommended threshold of 0.70, each construct is considered reliable.

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Cronbach's Alpha

Table 9. Cronbach's Alpha Value

Variable	Cronbach's alpha	Description
Electronic Attendance	0.855	Reliable
Work Discipline	0.960	Reliable
Employee Perfomance	0.949	Reliable

Source: SmartPLS output, 2026

The Cronbach's Alpha values for Electronic Attendance, Work Discipline, and Employee Performance were 0.855, 0.960, and 0.949, respectively. Since all values exceeded the recommended threshold of 0.70, all constructs were considered to have satisfactory reliability.

Model Fit Test

Tabel 10. Model Fit Test Result

Parameter	Rule of Thumb	Parameter Values	Description
SRMR	Less than 0.10	0.084	Fit
d-ULS	> 0,05	2.308	Fit
d-G	> 0,05	5.567	Fit
Chi Square	χ^2 statistics ≥ χ^2 table	746.898 ≥ 36.415	Fit
NFI	Approaching the value 1	0.542	Fit
GoF	**0.1 (small GOF), 0.25 (moderate GOF), 0.36 (strong GOF)**	0.655	Fit (Strong)
Q^2 Predictive Relevance	**Q^2 > 0:** Have predictive relevance **Q^2 < 0:** Lacks predictive relevance. **0.02** (Weak) 0.15 (Moderate) 0.35 (Strong)	Q^2 = 0.866 > 0	Fit (Strong)

Source: SmartPLS output, 2026

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1. Standardized Root Mean Square Residual (SRMR): The SRMR value of 0.084 is below the recommended threshold of 0.10, indicating that the model demonstrates a good fit and adequately represents the empirical data.
2. Unweighted Least Squares Discrepancy (d-ULS): The d-ULS value of 2.308 indicates that the model exhibits a satisfactory level of fit and is suitable for hypothesis testing and structural relationship analysis.
3. Geodesic Discrepancy (d-G): The d-G value of 5.567 suggests that the model achieves a good global fit, indicating that it adequately represents the relationships among the study variables.
4. Chi-Square: The Chi-Square value of 746.898 indicates that the model meets the required fit criteria, supporting its suitability for hypothesis testing.
5. Normed Fit Index (NFI): The NFI value of 0.542 indicates an acceptable level of model fit, suggesting that the model is adequate for representing the observed data.
6. Goodness of Fit (GoF): The GoF value of 0.655, which exceeds the recommended threshold of 0.36, indicates a strong overall model fit.
7. Q^2 Predictive Relevance: The Q^2 value of 0.866 indicates that the model has strong predictive relevance for the latent constructs.

Inner Model

1. R Square (R2)

Table 11. R Square (R^2) Test Results

Dependent Variable	R-*Square*
Electronic Attendance	0.491
Work Discipline	0.756

Source: SmartPLS output, 2026

The PLS-SEM analysis revealed that the R^2 value for Work Discipline was 0.491, indicating that 49.1% of the variance in Work Discipline is explained by the independent variables in the model, while the remaining 50.9% is attributable to factors outside the scope of this study. This result indicates a moderate predictive capability of the structural model. Meanwhile, the R^2 value for Employee Performance was 0.756, indicating that 75.6% of the variance in Employee Performance is explained by the proposed model, whereas the remaining 24.4% is influenced by other factors not included in the study. Based on the PLS-SEM evaluation criteria, this value falls

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into the substantial category, suggesting that the structural model has strong predictive power in explaining the relationships among the research variables.

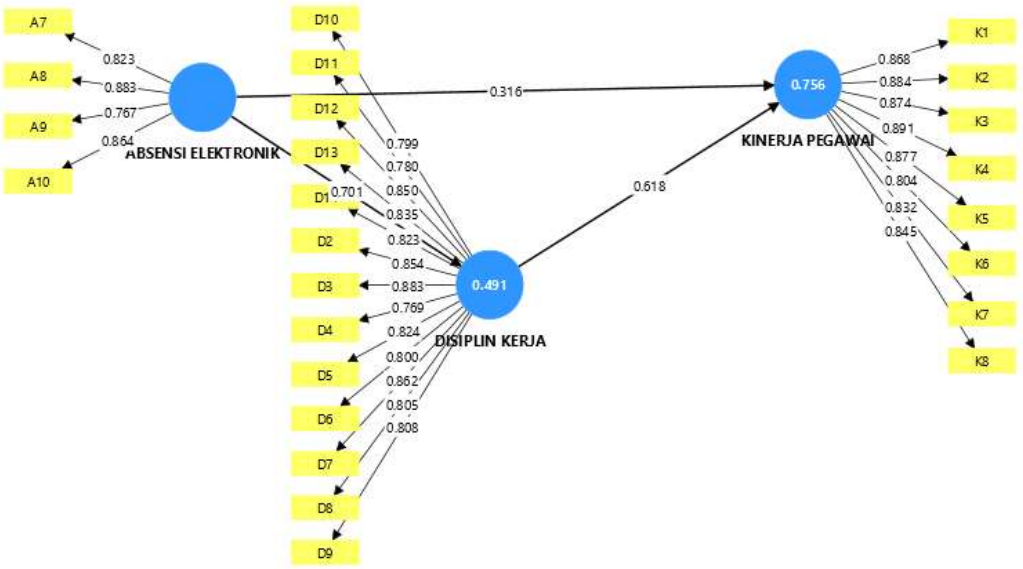


Figure 3 PLS SEM Algorithm model output

2. Significance (Hypothesis Testing)

Table 12. Results of Path Coefficient Bootstrapping Direct Effect

Variable Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Description
Electronic Attendance Work Discipline ->	0,701	0,711	0,100	7,030	0,000	Proven
Electronic Attendance -> Employee Performance	0,316	0,328	0,159	1,986	0,047	Proven
Work Discipline Employee Performance ->	0,618	0,610	0,152	4,072	0,000	Proven

Source: SmartPLS output, 2026

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a. Effect of Electronic Attendance on Work Discipline

The bootstrapping results indicate that Electronic Attendance has a positive and significant effect on Work Discipline, with a path coefficient of 0.701, a *t*-statistic of 7.030 (>1.96), and a *p*-value of 0.000 (<0.05). Therefore, H1 is supported. These findings suggest that the implementation of an accurate, transparent, and consistent electronic attendance system enhances employees' work discipline, particularly in terms of attendance, punctuality, and compliance with organizational regulations.

b. Effect of Work Discipline on Employee Performance

The results show that Work Discipline has a positive and significant effect on Employee Performance, with a path coefficient of 0.618, a *t*-statistic of 4.072 (>1.96), and a *p*-value of 0.000 (<0.05), supporting H2. This finding indicates that higher levels of work discipline contribute to improved employee performance. Moreover, Work Discipline serves as a mediating variable, strengthening the influence of Electronic Attendance on Employee Performance.

c. Effect of Electronic Attendance on Employee Performance

The bootstrapping analysis reveals that Electronic Attendance positively and significantly affects Employee Performance, with a path coefficient of 0.316, a *t*-statistic of 1.986 (>1.96), and a *p*-value of 0.047 (<0.05). Thus, H3 is supported. Although the direct effect is smaller than its effect on Work Discipline, the findings indicate that an effective electronic attendance system contributes to improving employee performance, both directly and indirectly through enhanced work discipline.

Table 13. Results of Path Coefficient Bootstrapping Indirect effect

Variable Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Electronic Attendance -> Work Discipline -> Employee Performance	0,433	0,428	0,111	3,913	0,000

Source: SmartPLS output, 2026

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Effect of Electronic Attendance on Employee Performance through Work Discipline

The bootstrapping results indicate that Electronic Attendance has a positive and significant indirect effect on Employee Performance through Work Discipline. This is evidenced by an indirect effect coefficient of 0.433, a *t*-statistic of 3.913 (>1.96), and a *p*-value of 0.000 (<0.05), supporting Hypothesis 4 (H_4). These findings suggest that improved implementation of the electronic attendance system enhances employees' work discipline, which subsequently leads to better employee performance. Since the direct effect of Electronic Attendance on Employee Performance is also significant, Work Discipline serves as a **partial mediator**, indicating that it strengthens the influence of Electronic Attendance on Employee Performance.

3. Effect Size (f^2)

Table 14. Effect size (f^2) test results

Indicator	Electronic Attendance	Work Discipline	Employee Perfomance
Electronic Attendance		0.965	0.208
Work Discipline			0.795
Employee Perfomance			

Source: SmartPLS output, 2026

The f^2 value is used to assess the effect size of an independent variable on a dependent variable within the structural model. According to the PLS-SEM criteria, f^2 values are classified as small (<0.02), medium (0.02–0.15), and large (>0.35). The *effect size (f^2)* results obtained in this study are presented as follows:

Table 15. Relationship between Variables

Relationship Between Variables	f^2 Value	Interpretation
Electronic Attendance → Work Discipline	0,965	High
Electronic Attendance → Employee Performance	0,208	Medium
Work Discipline → Employee Performance	0,795	High

Source: SmartPLS output, 2026

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1. Electronic Attendance → Work Discipline yielded an f^2 value of 0.965, indicating a large effect size. This result suggests that Electronic Attendance has a substantial effect on Work Discipline.
2. Electronic Attendance → Employee Performance yielded an f^2 value of 0.208, indicating a medium effect size. This finding suggests that Electronic Attendance has a moderate effect on Employee Performance.
3. Work Discipline → Employee Performance yielded an f^2 value of 0.795, indicating a large effect size. This result demonstrates that Work Discipline has a substantial effect on Employee Performance.

DISCUSSION

The findings indicate that Electronic Attendance has a positive and significant effect on Work Discipline, suggesting that the implementation of an electronic attendance system enhances employees' compliance with working hours and organizational regulations through more accurate, transparent, and objective attendance records. This finding is consistent with the Technology Acceptance Model (TAM), which posits that technologies perceived as easy to use and useful are more readily accepted, thereby encouraging more disciplined work behavior. Furthermore, the *effect size* (f^2) demonstrates a large effect, indicating that Electronic Attendance is a key factor in fostering a disciplined work culture.

The results also reveal that Work Discipline has a positive and significant effect on Employee Performance, implying that higher levels of work discipline lead to better employee performance. Employees with strong work discipline are more likely to comply with organizational rules, maintain punctuality, and complete their tasks according to established targets, thereby improving work effectiveness and productivity. The *effect size* (f^2) analysis indicates a large effect, confirming that work discipline is one of the primary determinants of employee performance.

In addition, the study demonstrates that Electronic Attendance has a positive and significant effect on Employee Performance. The implementation of the electronic attendance system not only improves attendance administration but also enhances productivity through more objective and accountable supervision. However, the *effect size* (f^2) falls within the medium category, suggesting that employee performance is influenced not only by the electronic attendance system but also by other factors, particularly work discipline.

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Furthermore, the analysis confirms that Work Discipline significantly mediates the relationship between Electronic Attendance and Employee Performance. This finding indicates that the benefits of implementing an electronic attendance system are maximized when accompanied by improvements in employees' work discipline. Therefore, the effectiveness of the electronic attendance system depends not only on technological implementation but also on the organization's ability to foster a culture of discipline that supports sustainable improvements in employee performance.

The interview findings with the Secretary and staff of the Metro City Transportation Agency further support the quantitative results. The informants stated that the electronic attendance system simplifies attendance recording, enhances transparency and supervision, and encourages employees to comply with working hours. Although minor technical issues, such as network disruptions, occasionally occur, the system continues to operate effectively and contributes to improvements in both work discipline and employee performance. These qualitative findings confirm that the electronic attendance system functions not only as an attendance recording tool but also as a supervisory mechanism that supports improved service quality and the achievement of organizational objectives.

CONCLUSION

1. Electronic Attendance has a positive and significant effect on Work Discipline. The SEM-PLS results show a path coefficient value of 0.701, a t-statistic of 7.030, and a p-value of 0.000. This indicates that the more optimal the implementation of electronic attendance, the higher the employees' work discipline. H1 is accepted.
2. Work Discipline has a positive and significant effect on Employee Performance. The SEM-PLS results show a path coefficient of 0.618, a t-statistic of 4.072, and a p-value of 0.000. This demonstrates that improving work discipline can enhance employee performance. H2 is accepted.
3. Electronic Attendance has a positive and significant effect on Employee Performance. The analysis results show a path coefficient of 0.316, a t-statistic of 1.986, and a p-value of 0.047, indicating that the implementation of electronic attendance contributes to improving employee performance. H3 is accepted.
4. Electronic Attendance affects Employee Performance through Work Discipline as an intervening variable. The indirect effect results show a coefficient of 0.433, a t-statistic of 3.913, and a p-value of 0.000. This proves that electronic attendance improves employee performance

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both directly and indirectly through work discipline. The research model has good predictive capability, with an R^2 value of 0.479 for Work Discipline, an R^2 value of 0.743 for Employee Performance, and a Q^2 value of 0.866.

IMPLICATION

Electronic Attendance has a positive and significant effect on Work Discipline. The SEM-PLS results show a path coefficient of 0.701, a t-statistic of 7.030, and a p-value of 0.000, indicating that the more optimal the implementation of electronic attendance, the higher the employees' work discipline (H1 is accepted). Work Discipline has a positive and significant effect on Employee Performance, with a path coefficient of 0.618, a t-statistic of 4.072, and a p-value of 0.000, demonstrating that improved work discipline can enhance employee performance (H2 is accepted). Furthermore, Electronic Attendance has a positive and significant effect on Employee Performance, as shown by a path coefficient of 0.316, a t-statistic of 1.986, and a p-value of 0.047, which indicates that electronic attendance contributes to improving employee performance (H3 is accepted). In addition, Electronic Attendance affects Employee Performance through Work Discipline as an intervening variable, with indirect effect results showing a coefficient of 0.433, a t-statistic of 3.913, and a p-value of 0.000. These findings confirm that electronic attendance improves employee performance both directly and indirectly through work discipline. The research model demonstrates good predictive capability, with an R^2 value of 0.479 for Work Discipline, an R^2 value of 0.743 for Employee Performance, and a Q^2 value of 0.866.

Suggestion

Electronic Attendance has a positive and significant effect on Work Discipline. The SEM-PLS results show a path coefficient of 0.701, a t-statistic of 7.030, and a p-value of 0.000, indicating that the more optimal the implementation of electronic attendance, the higher the employees' work discipline (H1 is accepted). Work Discipline has a positive and significant effect on Employee Performance, with a path coefficient of 0.618, a t-statistic of 4.072, and a p-value of 0.000, demonstrating that improved work discipline can enhance employee performance (H2 is accepted). Furthermore, Electronic Attendance has a positive and significant effect on Employee Performance, as shown by a path coefficient of 0.316, a t-statistic of 1.986, and a p-value of 0.047, which indicates that electronic attendance contributes to improving employee performance (H3 is accepted). In addition, Electronic Attendance affects Employee Performance through Work Discipline as an intervening variable, with indirect effect results showing a coefficient of 0.433, a

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t-statistic of 3.913, and a p-value of 0.000. These findings confirm that electronic attendance improves employee performance both directly and indirectly through work discipline. The research model demonstrates good predictive capability, with an R^2 value of 0.479 for Work Discipline, an R^2 value of 0.743 for Employee Performance, and a Q^2 value of 0.866.

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