



Does Digital Attendance System Quality Improve Lecturer Performance? The Mediating Effects of Technostress and Work Engagement

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ARTICLE INFO	ABSTRACT
Article history: Received: 4 July 2026 Revised: 7 August 2026 Accepted: 29 September 2026 Available online: 30 September 2026 E-ISSN: 2776-6276 P-ISSN: - How to cite: Metekohy, V.T., Louhenapessy, F. H., Noya, R.S., "Does Digital Attendance System Quality Improve Lecturer Performance? The Mediating Effects of Technostress and Work Engagement", Journal of Management Analytical and Solution (JoMAS), Vol. 6, No. 3, September, 2026, doi: doi.org/10.32734/jomas.v6i3.26876	The increasing adoption of digital technology has transformed human resource management practices in higher education, including the implementation of Digital Attendance Systems to enhance administrative efficiency and institutional governance. However, limited research has examined how Digital Attendance System Quality is related to lecturer performance through psychological mechanisms. This study investigates the relationship between Digital Attendance System Quality and Lecturer Performance, with Technostress and Work Engagement as mediating variables. A quantitative cross-sectional survey was conducted among lecturers at the Faculty of Economics and Business, Universitas Pattimura, Indonesia. Using a total sampling approach, 136 valid responses were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results show that Digital Attendance System Quality has a positive and significant effect on Technostress, while Technostress has a positive and significant effect on Work Engagement. Work Engagement has a positive and significant effect on Lecturer Performance, whereas the direct effect of Digital Attendance System Quality on Lecturer Performance is not significant. Furthermore, the sequential indirect effect of Digital Attendance System Quality on Lecturer Performance through Technostress and Work Engagement is positive and significant ($\beta = 0.172$, $p < 0.001$). These findings suggest that the relationship between digital attendance system quality and lecturer performance is explained more strongly through the sequential role of Technostress and Work Engagement than through a direct relationship. The study contributes to the Digital Human Resource Management literature by highlighting the role of psychological mechanisms in explaining the relationship between digital attendance system quality and lecturer performance during technology adoption. Keyword: <i>Digital Attendance System Quality, Technostress, Work Engagement, Lecturer Performance, Digital Human Resource Management</i>



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1. Introduction

Digital transformation has fundamentally changed the way organizations manage their human resources, prompting institutions across different sectors, including higher education, to incorporate digital technologies into routine HR activities. The integration of digital solutions has shifted human resource management beyond conventional administrative functions by enabling more efficient processes, supporting data-informed decisions, and improving overall organizational effectiveness [1][2][3]. This transformation has contributed to the rapid development of Digital Human Resource Management (Digital HRM), in which digital technologies are applied to various HR functions such as attendance administration, performance management, and personnel services [4]. One of the most widely implemented Digital HRM practices is the use of digital attendance systems, which enable attendance data to be captured automatically, accurately, and in real time while reducing administrative complexity [5]. As these systems become increasingly embedded in employees'

everyday work activities, understanding how users perceive their quality has become essential because such perceptions can influence employees' experiences, acceptance of technology, and subsequent workplace outcomes [6][7].

Digital attendance systems have expanded beyond their traditional role of documenting employee attendance and now serve as valuable tools for supporting broader administrative and managerial activities. By generating timely and reliable attendance information, these systems enable institutions to coordinate administrative processes more effectively, monitor workforce presence, and provide data that can inform managerial decisions [8]. Nevertheless, the successful implementation of digital attendance systems depends on more than the availability of technological features alone. Even when a system operates as intended, users may evaluate its effectiveness differently based on their experiences with usability, response time, reliability, accessibility, accuracy, and their ability to adapt to technological changes [9][10]. Therefore, system quality should be understood not only from a technical perspective but also from users' perceptions of how effectively the system supports their daily work activities [11][12].

The implementation of the Personnel Information System (SIGAP) at Universitas Pattimura provides a practical example of this situation. SIGAP serves as the official digital attendance system for lecturers, including those at the Fakultas Ekonomi dan Bisnis. The attendance process requires users to log into the application, verify their location through the Global Positioning System (GPS), maintain an internet connection, and submit attendance records online. At the time of this study, SIGAP had been implemented for less than one year and was still undergoing continuous refinement through feature updates and operational adjustments. As a result, lecturers did not share identical experiences while interacting with the system. Some perceived SIGAP as user-friendly, efficient, and capable of simplifying attendance administration, while others encountered technical errors, feature modifications, unstable internet connections, and the need to continuously adapt to changes in system procedures.

The differences in lecturers' experiences suggest that the same technology can create both opportunities and challenges in the workplace. These varying experiences suggest that workplace technology can play a dual role in employees' work. According to the Job Demands–Resources (JD-R) Theory, digital technologies function as job resources when they facilitate work processes, improve efficiency, and support employees in accomplishing their tasks. However, the same technologies may also become job demands when users are required to invest additional effort to learn new features, adapt to system changes, or overcome technical difficulties. Such demands consume employees' physical and psychological resources and may ultimately influence their work-related outcomes [13][14][15][16].

A common challenge associated with digital transformation is technostress, referring to the psychological strain employees experience when they are required to adapt to growing technological demands [17]. Employees may encounter various technological difficulties, including unstable internet connections, login failures, inaccurate GPS detection, application errors, and frequent system updates, all of which can increase mental workload and create feelings of frustration [49]. Nevertheless, technology-related demands do not necessarily produce adverse psychological responses, particularly in professional environments where employees demonstrate strong work commitment and intrinsic motivation.

In addition to technostress, work engagement constitutes another key psychological factor that shapes employees' responses to digital technologies [18]. Within higher education institutions, lecturers with high levels of work engagement are generally more willing to invest their physical, cognitive, and emotional energy in teaching, research, community service, and various academic responsibilities. Previous research has also found a positive and significant relationship between employee engagement and employee performance [48]. Accordingly, higher levels of work engagement are expected to improve Lecturer Performance by encouraging greater motivation, sustained commitment, and effectiveness in accomplishing academic responsibilities [19][20][21].

Existing empirical evidence indicates that Digital Attendance System Quality plays an important role in shaping employees' psychological experiences and work-related outcomes. Digital systems characterized by ease of use, reliability, responsiveness, and accessibility are more likely to reduce technology-related difficulties while encouraging employees to perform their responsibilities more effectively [22][23]. Research has also shown that lower levels of technostress contribute to stronger work engagement, enabling employees to maintain higher levels of energy, dedication, and concentration when carrying out their work [24]. Furthermore, employees who are highly engaged tend to demonstrate superior job performance because they invest greater effort, persistence, and commitment in achieving organizational objectives [25]. Previous research has also reported a significant relationship between employee engagement and employee performance, including studies that examine this relationship within a mediating framework [50]. In addition, work engagement has consistently been recognized as an important predictor of employee performance

[26][27][28]. Despite these findings, empirical evidence examining the combined relationships among Digital Attendance System Quality, Technostress, Work Engagement, and Lecturer Performance remains limited, particularly within higher education institutions where digital attendance systems have only recently been implemented.

Despite the growing body of literature on digital technologies in human resource management, limited attention has been given to understanding how Digital Attendance System Quality influences Lecturer Performance through employees' psychological responses. Most previous studies have primarily examined the direct effects of digital systems on organizational or individual outcomes, while the underlying mechanisms involving Technostress and Work Engagement have received comparatively less attention, particularly in higher education settings [29]. This study addresses that limitation by proposing an integrated research model that examines the relationships among Digital Attendance System Quality, Technostress, Work Engagement, and Lecturer Performance within the context of a newly implemented digital attendance system. By investigating these interrelated constructs simultaneously, the present study seeks to provide a more comprehensive understanding of how system quality shapes lecturers' behavioral and performance outcomes during digital transformation.

Building upon the issues discussed above, this study investigates the relationships among Digital Attendance System Quality, Technostress, Work Engagement, and Lecturer Performance within the context of higher education. The study seeks to explain how lecturers' psychological responses influence the relationship between system quality and performance, thereby providing a more comprehensive understanding of technology adoption in academic institutions. The findings are expected to extend the existing Digital HRM literature by clarifying the mechanisms through which Digital Attendance System Quality affects Lecturer Performance through Technostress and Work Engagement. From a practical standpoint, the results may assist university leaders and policymakers in designing, implementing, and improving digital attendance systems that not only operate effectively from a technical perspective but also support lecturers' well-being, engagement, and overall performance.

2. Method

2.1 Research Design and Sample

This research adopted a quantitative cross-sectional survey to examine the relationships among the proposed research variables. The empirical investigation involved lecturers from the Fakultas Ekonomi dan Bisnis at Universitas Pattimura, all of whom used SIGAP as their institutional digital attendance system. The study population consisted of all 141 lecturers working in Fakultas Ekonomi dan Bisnis. Because the entire population was manageable and all lecturers had direct experience using SIGAP, the study employed a census approach (total sampling). A total of 136 usable questionnaires were returned, representing a response rate of approximately 96.45%.

2.2 Variables, Measurement, and Research Framework

This study examined four constructs: Digital Attendance System Quality (ADS Quality) as the exogenous construct, Technostress (TS) and Work Engagement (WE) as mediating constructs, and Lecturer Performance (LP) as the endogenous construct. The measurement items were adapted and contextualized to the setting of lecturers using the SIGAP digital attendance system at the Faculty of Economics and Business, Universitas Pattimura. All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate higher levels of the respective constructs; for ADS Quality, higher scores indicate a more favorable perception of SIGAP quality.

Digital Attendance System Quality. Digital Attendance System Quality was operationalized based on the System Quality dimension of the DeLone and McLean Information Systems Success Model [44]. Seven items were used and contextualized to the SIGAP digital attendance system. The items assessed ease of learning and use, interface and menu clarity, response speed, system stability, location-validation accuracy, accessibility, and support for attendance administration. The items were contextualized to reflect the specific characteristics and functions of SIGAP used by lecturers.

Technostress. Technostress was measured using five items adapted from the technostress literature, particularly the Technostress Creators framework developed by [45], and contextualized to SIGAP use. The items assessed perceived pressure when experiencing system problems, frustration caused by technical disruptions, the need to adapt to system updates, concerns about system disruptions during attendance, and perceived mental workload associated with SIGAP use. Higher scores indicate higher perceived technostress.

Work Engagement. Work Engagement was measured using five items adapted from the Utrecht Work Engagement Scale (UWES) developed by Schaufeli and Bakker and further examined in the development of

the UWES-9 [46]. The items represented the dimensions of vigor, dedication, and absorption and were contextualized to lecturers' work. Higher scores indicate higher work engagement.

Lecturer Performance. Lecturer Performance was operationalized based on the lecturer performance dimensions discussed by [47], particularly teaching, research, and community service. The five items were contextualized to the duties of lecturers at the Faculty of Economics and Business, Universitas Pattimura. The items assessed lecturers' performance in preparing and conducting teaching activities, completing academic administration, conducting research, and carrying out community service activities. Higher scores indicate higher perceived lecturer performance.

2.3 Data Collection and Analysis

Data were collected from July 6 to July 17, 2026, using an online questionnaire administered through Google Forms. The questionnaire link was distributed to lecturers through WhatsApp. The target population consisted of all 141 lecturers at the Faculty of Economics and Business, Universitas Pattimura, as all lecturers in the faculty were required to use the SIGAP digital attendance system. Therefore, a census (total sampling) approach was employed, in which all members of the population were invited to participate.

A total of 136 usable questionnaires were returned, representing a response rate of 96.45%. The remaining five lecturers did not submit a response during the data-collection period. The questionnaire collected respondents' demographic information, including age and gender. Respondents were informed that their responses would be treated confidentially. To reduce potential common method bias, the questionnaire presented the study variables in separate sections, and respondents were instructed to answer the measurement items based on their actual experience using the SIGAP digital attendance system.

All questionnaire items were set as required fields in Google Forms, so respondents could not submit the questionnaire with unanswered measurement items. Consequently, the 136 questionnaires included in the analysis contained complete responses to the measurement items.

The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The analysis consisted of two stages: evaluation of the measurement model and evaluation of the structural model. The measurement model was assessed through outer loadings, internal consistency reliability, convergent validity, and discriminant validity. Internal consistency reliability was evaluated using Cronbach's alpha, rho_A, and composite reliability, while convergent validity was assessed using the average variance extracted (AVE). Discriminant validity was examined using the heterotrait-monotrait ratio (HTMT). The structural model was evaluated using the coefficient of determination (R^2), effect size (f^2), variance inflation factor (VIF), and path coefficients. Bootstrapping was used to assess the statistical significance of the hypothesized relationships and indirect effects.

2.4 Research Procedure

The research was conducted in several stages, beginning with identifying the research phenomenon, followed by a review of the relevant literature and the development of the conceptual framework and research hypotheses. Subsequently, the research instrument was prepared and distributed to respondents. After data collection, the measurement and structural models were evaluated using PLS-SEM, followed by hypothesis testing and interpretation of the findings in relation to the theoretical framework and the implementation context of SIGAP.

3. Results and Discussion

3.1 Measurement Model and Structural Model Evaluation

The empirical analysis began with an assessment of the measurement model to ensure that each construct was represented accurately by its indicators. After confirming the adequacy of the measurement model, the structural model was evaluated to examine the relationships among the proposed constructs and the model's explanatory capability.

3.1.1 Validity and Reliability Test

Construct validity was examined to determine whether the observed indicators adequately represented their corresponding latent variables. The results of this assessment are summarized in Table 1.

Table 1. Indicator validity test (Outer Loading)

Variable			Indicator	Outer Loading Range
Digital Attendance System	Quality/ SIGAP (ADS)		ADS1 - ADS7	0,734 – 0,878
	Lecturer Performance (LP)		LP1 – LP5	0,722–0,798
	Technostress (TS)		TS1 – TS5	0,763–0,886
	Work Engagement (WE)		WE1 – WE5	0,739–0,875

The outer loading analysis demonstrated that every indicator achieved a loading value above the recommended threshold, indicating that each item contributed meaningfully to measuring its intended construct.

Table 2. Reliability Test Results

	Cronbach's Alpha	rho A	Composite Reliability	AVE
ADS	0,934	0,944	0,946	0,716
LP	0,829	0,862	0,862	0,585
TS	0,886	0,895	0,916	0,687
WE	0,884	0,894	0,915	0,685

Convergent validity was further evaluated using the Average Variance Extracted (AVE). The obtained values ranged from 0.585 to 0.716, suggesting that each construct explained more than half of the variance of its indicators. Construct reliability was assessed using Cronbach's Alpha and Composite Reliability. Internal consistency was supported by satisfactory Cronbach's Alpha and Composite Reliability values. All constructs exceeded the recommended cut-off values, confirming that the measurement instrument produced consistent results across its indicators.

3.1.2 Heterotrait-Monotrait Ratio (HTMT) Test

Table 3. HTMT Results

	HTMT
ADS→LP	0,332
ADS→TS	0,601
ADS→WE	0,287
LP→TS	0,473
LP→WE	0,788
TS→WE	0,468

To ensure that the constructs captured conceptually distinct phenomena, discriminant validity was assessed using the Heterotrait–Monotrait Ratio (HTMT). The HTMT values ranged from 0.287 to 0.788, all of which were below the recommended threshold of 0.90. These findings confirm that each construct is empirically distinct from the others. Overall, the results demonstrate that Digital Attendance System Quality, Technostress, Work Engagement, and Lecturer Performance represent separate constructs within the proposed model. Since convergent validity, construct reliability, and discriminant validity were all satisfactorily established, the measurement model was considered appropriate for structural model evaluation.

3.1.3 Structural Model Evaluation: R^2 , f^2 , and VIF

The structural model was evaluated using the coefficient of determination (R^2), effect size (f^2), and Variance Inflation Factor (VIF).

The R^2 values indicate the explanatory power of the exogenous construct for the endogenous variables. The results show that Digital Attendance System Quality explains 31.8% of the variance in Technostress ($R^2 = 0.318$). The model also explains 18.5% of the variance in Work Engagement ($R^2 = 0.185$). Meanwhile, the R^2 value for Lecturer Performance is 0.555, indicating that the proposed model accounts for approximately 55.5% of the variance in lecturer performance. These findings suggest that the model has satisfactory explanatory capability, particularly in explaining Lecturer Performance.

The effect size (f^2) was calculated to evaluate the contribution of each structural relationship. The path from Digital Attendance System Quality to Technostress (ADS → TS) produced an f^2 value of 0.467,

indicating a large effect. The relationship between Technostress and Work Engagement (TS → WE) yielded an f^2 value of 0.227, representing a medium effect. The strongest contribution was found in the relationship between Work Engagement and Lecturer Performance (WE → LP), with an f^2 value of 1.048, indicating a large effect. In contrast, the direct relationship between Digital Attendance System Quality and Lecturer Performance (ADS → LP) showed an f^2 value of only 0.023, suggesting a small effect. These results imply that Work Engagement plays a substantial role in improving lecturer performance, whereas the direct contribution of system quality is relatively limited.

Collinearity was assessed using the Variance Inflation Factor (VIF). The VIF values ranged from 1.000 to 1.081, which are well below the recommended threshold of 5.0. This indicates that multicollinearity is not a concern in the proposed structural model. Consequently, the structural relationships can be interpreted with confidence, and hypothesis testing can proceed.

3.2 Hypothesis Testing and Discussion

The proposed hypotheses were tested using the bootstrapping procedure in SmartPLS by examining the path coefficients, t-statistics, and p-values. The results reveal that three structural relationships are statistically significant, whereas the direct effect of Digital Attendance System Quality on Lecturer Performance is not statistically significant.

Table 4. Hypothesis Test Results (Direct Effect)

	Coefficient	T Test	P Test
ADS→TS	0,564	7,887	0,000
TS→WE	0,430	5,085	0,000
WE→LP	0,710	15,848	0,000
ADS→LP	0,104	1,395	0,164

3.2.1 The Effect of Digital Attendance System Quality on Technostress

The structural model analysis revealed that Digital Attendance System Quality was positively associated with Technostress ($\beta = 0.564$, $t = 7.887$, $p < 0.001$). Therefore, H1, which proposed a negative relationship between Digital Attendance System Quality and Technostress, is not supported. The positive coefficient indicates that higher perceived system quality was associated with higher reported technostress in this sample.

The empirical findings indicate that the relationship between Digital Attendance System Quality and Technostress differs from the initial expectation. Based on the Job Demands–Resources (JD-R) Theory, technology is generally regarded as a *job resource* when it helps employees perform their tasks more efficiently, simplifies work processes, and reduces job demands. Under these conditions, a digital attendance system with better quality would normally be expected to alleviate technology-related stress. However, the results of this study reveal a different pattern within the implementation of SIGAP at Universitas Pattimura.

This finding may be related to the implementation context of SIGAP, which was still in its early stage during the period of data collection. Although lecturers generally perceived the system as useful and adequately functional, they were also required to adapt to a new digital working environment. Daily attendance involved several interconnected processes, including logging into the application, activating GPS, verifying location accuracy, relying on a stable internet connection, and adjusting to regular system updates. These contextual conditions may have increased the technological demands experienced by lecturers during the transition to the new system. Consequently, higher perceptions of system quality may have coexisted with technostress during the adaptation period. However, because the present study did not directly measure the implementation stage, user familiarity, or adaptation demands, this explanation should be considered tentative and contextual rather than a directly tested mechanism.

These findings suggest that, during the early phase of digital transformation, system quality and technostress may coexist. A system may perform well from a technical perspective while users continue to experience psychological pressure associated with learning new procedures, adjusting to changing work routines, and developing confidence in using the technology. In this situation, technostress may reflect the adaptation demands associated with the introduction of a new digital system rather than solely shortcomings in system quality. However, this interpretation should be understood as a contextual explanation rather than a causal mechanism established by the present study.

A similar pattern has been reported in recent studies on digital transformation. Hoai et al. [32] explained that technostress may increase during employees' adaptation to newly implemented digital technologies. Likewise, Tarafdar et al. [33] discussed how learning and adjusting to digital systems can remain a source of

psychological pressure even when users perceive technology as useful. In contrast, Jo & Park [9] reported that higher system quality can reduce technology-related stress by improving usability and minimizing operational difficulties. These differences suggest that the relationship between system quality and technostress may depend partly on the organizational and implementation context in which digital technologies are introduced. In the present study, the early implementation context of SIGAP provides a possible contextual explanation for the positive relationship observed between system quality and technostress. Nevertheless, because implementation maturity was not directly measured, this interpretation remains tentative.

From a practical perspective, these findings emphasize that the implementation of Digital Human Resource Management (Digital HRM) should not be assessed solely through technical system performance. Universities may also need to support users throughout the adaptation process by providing continuous training, clear operational guidelines, responsive technical assistance, and effective communication regarding system updates. Such support may ease the transition to digital work practices and reduce unnecessary technology-related pressure, enabling digital attendance systems to function not only as administrative tools but also as organizational resources that support lecturer performance.

3.2.2 The Effect of Technostress on Work Engagement

The results of the hypothesis testing indicate that Technostress has a positive and significant effect on Work Engagement ($\beta = 0.430$, $t = 5.085$, $p < 0.001$). Therefore, H2, which proposed a negative relationship between Technostress and Work Engagement, is not supported.

Contrary to the proposed hypothesis, lecturers who experienced higher levels of technostress did not necessarily become less engaged in their work. Instead, the findings indicate that technology-related pressure and work engagement were able to coexist during the implementation of the SIGAP digital attendance system. This result suggests that the psychological impact of technology is not always detrimental, particularly when users are still adapting to a newly introduced digital system.

From the perspective of the Job Demands–Resources (JD-R) Theory, technostress is generally regarded as a job demand that consumes employees' physical and psychological resources, potentially reducing their enthusiasm and involvement at work. Nevertheless, the findings of this study reveal that the relationship is more dynamic than originally expected. During the early stages of digital transformation, the pressure associated with learning and adjusting to a new system does not necessarily diminish employees' engagement. Instead, both adaptation-related pressure and professional commitment may emerge simultaneously.

One possible explanation can be found in the nature of academic work itself. Regardless of the challenges associated with using SIGAP, lecturers remain responsible for carrying out teaching, research, community service, and various academic and administrative duties. These responsibilities require sustained commitment and professionalism, even when new technologies introduce additional demands. As a result, although lecturers experienced pressure while learning to use the new digital attendance system, they continued to demonstrate dedication to their work. In this context, technostress appears to reflect the effort required to adapt to digital transformation rather than a condition that weakens work engagement.

A similar pattern has been reported in several recent studies. Wang et al. [34] reported that employees may experience temporary increases in technostress while adapting to newly implemented digital technologies. Likewise, Daud [35] observed that adaptation demands may remain a source of psychological pressure even when digital systems are perceived as useful and beneficial. However, the findings of the present study differ from those reported by Harunavamwe & Kanengoni [36], who found that technostress was negatively associated with work engagement and was related to higher emotional exhaustion and lower employee motivation. The difference is likely attributable to the context of the present research. At the time the study was conducted, SIGAP was still in the early stages of implementation, and lecturers were simultaneously learning new operational procedures while maintaining their academic responsibilities. Under these circumstances, technology-related pressure became part of the adaptation process rather than a factor that undermined their engagement with work.

These findings provide an important insight into the implementation of Digital Human Resource Management (Digital HRM) in higher education. They indicate that the presence of technostress should not automatically be interpreted as evidence of unsuccessful digital transformation. During the transition period, a certain degree of technology-related pressure may represent a normal response as employees adjust to new work practices. For this reason, universities should complement digital system implementation with continuous training, responsive technical support, and clear communication regarding system updates. Such efforts can facilitate users' adaptation, reduce unnecessary technological burdens, and help maintain high levels of work engagement throughout the digital transformation process.

3.2.3 The Effect of Work Engagement on Lecturer Performance

The hypothesis testing results indicate that Work Engagement has a positive and significant effect on Lecturer Performance ($\beta = 0.710$, $t = 15.848$, $p < 0.001$). Therefore, H3 is supported. Among all the relationships examined in this study, this path demonstrates the strongest effect, indicating that Work Engagement plays a central role in improving lecturers' performance. This finding is further supported by the f^2 value of 1.048, which represents a large effect size and highlights the substantial contribution of Work Engagement to Lecturer Performance.

The findings are consistent with the Job Demands–Resources (JD-R) Theory, which proposes that employees who possess sufficient job resources are more likely to experience higher levels of work engagement, reflected in greater vigor, dedication, and absorption in their work. These positive psychological conditions encourage individuals to invest more energy and commitment in completing their responsibilities, ultimately leading to better job performance. In the context of this study, lecturers who remained highly engaged were more capable of carrying out their academic and professional responsibilities despite the challenges associated with the implementation of a new digital attendance system.

This relationship may also be explained by the nature of academic work. Lecturers are responsible not only for administrative tasks but also for teaching, conducting research, providing community service, and fulfilling various institutional responsibilities. Maintaining enthusiasm, commitment, and active involvement in these activities enables lecturers to sustain high levels of performance even when they encounter technological challenges in their daily work. Accordingly, the findings suggest that lecturers' psychological attachment to their work is a more influential determinant of performance than the administrative demands associated with digital systems.

The present findings are consistent with previous studies reporting a positive relationship between Work Engagement and employee performance. Jo & Shin [37], demonstrated that engaged employees tend to exhibit higher levels of energy, dedication, and persistence, which contribute to improved work outcomes. Similarly, Albrecht et al. [38], argued that Work Engagement functions as a motivational process through which job resources are translated into higher individual performance. More recent studies have also confirmed that employees who remain psychologically engaged are better able to maintain productivity, adapt to organizational changes, and achieve superior performance outcomes, even in technology-intensive work environments [39]. The results of the present study extend this evidence by demonstrating that the positive role of Work Engagement also applies to lecturers who are adapting to the implementation of Digital Human Resource Management (Digital HRM) practices in higher education.

From a practical perspective, these findings suggest that universities should not focus exclusively on improving the technical quality of digital systems. Equal attention should be devoted to creating a work environment that strengthens lecturers' engagement through organizational support, opportunities for professional development, effective leadership, and a positive academic climate. Such efforts can help lecturers remain motivated and fully involved in their professional responsibilities, allowing Digital HRM initiatives to contribute not only to administrative efficiency but also to sustainable improvements in lecturer performance.

3.2.4 The Effect of Digital Attendance System Quality on Lecturer Performance

The hypothesis testing results indicate that Digital Attendance System Quality has a positive but non-significant effect on Lecturer Performance ($\beta = 0.104$, $t = 1.395$, $p = 0.164$). Therefore, H4 is not supported. Although the direction of the relationship is positive, the statistical evidence suggests that improvements in the quality of the digital attendance system do not directly translate into higher levels of lecturer performance. This finding suggests that the role of SIGAP should be understood within the scope of its primary function. As a digital attendance system, SIGAP is designed to facilitate attendance recording and administrative processes rather than directly influencing the core responsibilities of lecturers. Lecturer performance encompasses a broad range of academic activities, including teaching, research, community service, and other institutional responsibilities. Consequently, a system that is easy to use, reliable, and technically efficient may improve administrative efficiency without necessarily leading to immediate improvements in overall academic performance.

The relatively small f^2 value of 0.023 further supports this interpretation by indicating that the direct contribution of Digital Attendance System Quality to Lecturer Performance is limited. From the perspective of the Job Demands–Resources (JD-R) Theory, digital technology represents a job resource that facilitates work processes. However, job resources do not always produce direct improvements in performance. Instead, their influence often operates through psychological mechanisms that shape employees' motivation, attitudes, and work behavior. This perspective is consistent with the conceptual framework of the present study, which proposes that the impact of Digital Attendance System Quality is more likely to occur indirectly through

Technostress and Work Engagement rather than through a direct pathway. The present findings are partially consistent with previous research on information system quality and organizational performance. Lutfi [40] emphasized that the benefits of information systems are not generated solely by technical system quality but also depend on how users interact with and utilize the system in their daily work. Likewise, more recent studies on Digital Human Resource Management (Digital HRM) have suggested that digital HR technologies improve organizational outcomes when they enhance employees' work experiences, support decision-making, and strengthen engagement, rather than merely automating administrative tasks [41]. However, the present findings differ from studies reporting a direct positive relationship between system quality and employee performance. One possible explanation lies in the context of this research, where SIGAP was still in the early stage of implementation and primarily functioned as an administrative attendance system. Under these circumstances, improvements in system quality alone may not have been sufficient to produce measurable changes in lecturers' overall performance. From a practical perspective, these findings indicate that universities should not expect digital attendance systems to improve lecturer performance solely by enhancing technical features. Digital HRM initiatives should be complemented by strategies that strengthen lecturers' psychological engagement with their work, provide continuous support during digital transformation, and integrate digital systems into broader academic and human resource management processes. In this way, digital attendance systems can become part of a more comprehensive organizational strategy for improving lecturer performance rather than functioning only as administrative tools.

3.2.5 The Mediating Roles of Technostress and Work Engagement

The mediation analysis was conducted using the specific indirect effects procedure to examine whether the relationships among Digital Attendance System Quality, Technostress, Work Engagement, and Lecturer Performance operate through the proposed mediating pathways. The results show that all three specific indirect effects are statistically significant. The indirect effect of Technostress on Lecturer Performance through Work Engagement is positive and significant ($\beta = 0.305$, $SE = 0.060$, $t = 5.060$, $p < 0.001$, 95% bias-corrected CI [0.163, 0.400]). The sequential indirect effect of Digital Attendance System Quality on Lecturer Performance through Technostress and Work Engagement is also positive and significant ($\beta = 0.172$, $SE = 0.043$, $t = 4.038$, $p < 0.001$, 95% bias-corrected CI [0.086, 0.253]). In addition, the indirect effect of Digital Attendance System Quality on Work Engagement through Technostress is positive and significant ($\beta = 0.243$, $SE = 0.059$, $t = 4.094$, $p < 0.001$, 95% bias-corrected CI [0.117, 0.355]). All bias-corrected confidence intervals exclude zero, providing evidence of statistically significant specific indirect effects. The mediation analysis was conducted using 500 bootstrap resamples with bias-corrected 95% confidence intervals (2.5% and 97.5%). These findings indicate that the proposed psychological pathways provide significant indirect effects among the constructs, including the sequential pathway from Digital Attendance System Quality to Lecturer Performance through Technostress and Work Engagement.

Table 5. Specific Indirect Effects

Specific Path	Indirect	β (O)	SE	t-value	p-value	Bias-Corrected 2.5% CI	Bias-Corrected 97.5% CI
TS $\rightarrow$ WE $\rightarrow$ LP		0,211806	0.060	5.060	<0.001	0,113194	0,277778
ADS $\rightarrow$ TS $\rightarrow$ WE $\rightarrow$ LP		0,119444	0.043	4.038	<0.001	0.086	0,175694
ADS $\rightarrow$ TS $\rightarrow$ WE		0,16875	0.059	4.094	<0.001	0,08125	0,246528

The mediation results provide a clearer explanation for the insignificant direct effect of Digital Attendance System Quality on Lecturer Performance observed in H4. Although the quality of the digital attendance system alone was not significantly associated with Lecturer Performance through a direct path, it was associated with lecturers' psychological responses during technology use. In the proposed model, these psychological responses are represented by Technostress and Work Engagement, with Work Engagement showing the strongest association with Lecturer Performance. In other words, the benefits of digital attendance systems are realized not simply through their technical characteristics but also through the way users experience, interpret, and adapt to the technology in their daily work. The findings can be understood from the perspective of the Job Demands–Resources (JD-R) Theory. During the early implementation of SIGAP, lecturers were required to adapt to new digital work routines, including GPS verification, online attendance procedures, and continuous system updates. These adaptation demands generated Technostress, but the

pressure did not necessarily reduce lecturers' commitment to their professional responsibilities. Instead, lecturers continued to demonstrate high levels of Work Engagement because of their responsibility to carry out teaching, research, community service, and other academic duties. Consequently, Work Engagement functioned as the key psychological mechanism that translated lecturers' experiences with the digital system into higher levels of performance.

The present findings are consistent with previous studies suggesting that the effects of digital technologies on employee performance are often indirect rather than immediate. Lee and Jo [42] argued that job resources influence performance through motivational processes, particularly Work Engagement. Likewise, Ochonogor & Amah [43] emphasized that engaged employees are more likely to maintain high levels of energy, dedication, and persistence, leading to superior performance outcomes. Recent studies in the field of Digital Human Resource Management (Digital HRM) have also highlighted that the organizational value of digital HR technologies depends not only on system quality but also on employees' psychological adaptation and work experiences [41]. Therefore, the present study extends previous research by demonstrating that the effectiveness of a digital attendance system should be understood as a sequential process in which system quality influences psychological responses, psychological responses shape work engagement, and work engagement ultimately drives lecturer performance.

From a practical perspective, these findings imply that universities should not focus exclusively on improving the technical quality of digital attendance systems. Equal attention should be given to supporting lecturers throughout the digital transformation process by providing continuous training, clear communication regarding system updates, responsive technical assistance, and initiatives that strengthen Work Engagement. Such strategies can help ensure that digital HR technologies become organizational resources that enhance both employees' work experiences and long-term performance.

4. Conclusion

This study shows that the relationship between digital attendance systems and lecturer performance is not simply a direct one. The findings point to a more complex pattern in which lecturers' psychological experiences are closely related to how digital system quality is associated with their work outcomes. Specifically, Digital Attendance System Quality was positively associated with Technostress, while Technostress was positively associated with Work Engagement. This suggests that lecturers may experience technology-related pressure while continuing to remain engaged in their professional responsibilities during the adaptation process. Work Engagement also showed the strongest association with Lecturer Performance among the structural relationships examined. In contrast, Digital Attendance System Quality was not significantly associated with Lecturer Performance through a direct path. The findings further showed a significant sequential indirect relationship between Digital Attendance System Quality and Lecturer Performance through Technostress and Work Engagement. These results highlight the importance of looking beyond the technical features of digital systems when examining Digital Human Resource Management. How users experience, understand, and adapt to technology also appears to be relevant to the relationship between digital system quality and work outcomes. From a theoretical perspective, these findings contribute to the application of the Job Demands–Resources Theory by showing that the observed relationship between digital attendance system quality and lecturer performance is closely related to psychological mechanisms rather than a significant direct relationship. From a practical perspective, the findings suggest that universities should complement improvements in digital systems with continuous training, organizational support, and effective change management. Such support may help lecturers adapt more effectively to changes in their digital work environment.

Several limitations should be considered when interpreting these findings. First, the cross-sectional design does not allow changes in lecturers' responses to be observed over time or causal relationships to be established. Second, the respondents were drawn from a single faculty within one university, which limits the generalizability of the findings to other institutional settings. Finally, SIGAP was still in its early stage of implementation, and lecturers' perceptions may change as they become more familiar with the system. Future studies could therefore use longitudinal designs, involve participants from different faculties or universities, and examine additional factors such as digital readiness, digital literacy, organizational support, and change management. These approaches may provide a broader understanding of how Digital HRM is experienced and implemented in higher education. Overall, the findings indicate that understanding the relationship between Digital HRM implementation and lecturer performance requires attention not only to the technical quality of digital systems but also to users' adaptation, Work Engagement, and the organizational support available during digital transformation.

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