

Moderating Role of Digital Literacy on the Nexus between Electronic Human Resource Management Practices and Organizational Performance of Federal Universities in North-Western Nigeria

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Abstract

Technology adoption enhances human resource capabilities to contribute to organizational efficiency and competitive advantage. This study examined how electronic human resources management (e-HRM) practices, moderated by digital literacy, improve organizational performance in North-Western Nigeria. The study was guided by the Technology Acceptance Model, complemented by Resource Base View and Human Capital Theories. Using a cross-sectional survey, data were collected by questionnaire from 592 employees of seven federal universities in North-Western Nigeria. A total sample size of 448 respondents was used. Descriptive and inferential statistics tests using the Partial Least Squares Structural Equation Modelling (PLS-SEM) was used to analyse the data. The findings revealed that digital literacy, e-communication and e-performance appraisal have positive and statistically significant effects on organizational performance, while e-recruitment has a negative statistically significant effect on organizational performance. This suggests that the existing e-recruitment systems may not be adequately developed, properly utilized, or effectively integrated into institutional recruitment processes. Also, digital literacy has a significant moderating role in the relationship between e-performance appraisal, e-communication, and organizational performance. However, digital literacy exhibited negative but significant moderating influence on the relationship between e-recruitment and organizational performance. This would imply that possessing digital competencies alone is insufficient to guarantee improved recruitment outcomes when the supporting technological infrastructure and recruitment systems are ineffective. Based on these findings, the study recommends that the management of federal universities should establish technical support and mentoring systems to ensure staff continuously improve their digital capabilities and adapt to evolving technologies.

Keywords: Digital Literacy, e-Communication, Electronic Human Resource Management, Organizational Performance, e-Performance Appraisal

INTRODUCTION

Digital dynamics have intensified expectations for universities to produce skilled and competitive manpower with capabilities to function in a global environment. This imperative calls on universities in Nigeria to improve their outputs abreast of changing labour market needs, output quality being measured through success in teaching and learning, research and mentoring, and engagements with societies. Strategic integration of electronic human resource management (e-HRM) could support this goals by blending HR processes for enhanced service delivery. The extent to which electronic Human Resource Management (e-HRM) may contribute to performance could derive from the depth of employees digital literacy levels, which tend to moderate the effective and efficient utilization of technological systems (AlHamad et al., 2022; Gede & Huluka, 2024; Obama et al., 2020). A survey by the United Nations Educational, Social, and Cultural Organization, (UNESCO), (2024), revealed that Harvard University ranked top with 80% - 90% for integrating e-HRM into HR activities covering recruitment, payroll, research and development, performance management, training, and administrative operations, followed by University of Leeds potentially at 70% - 85% with academic research and practices. On the other hand, a survey by World Bank of African Higher Education revealed that universities in Rivers and

Bayelsa in Nigeria are generally e-HRM integrated at 30% - 40%, while institutions in Sokoto State are at 20% - 30% and the Federal University Dutsin-MA accounted for 30% - 40%. The global and African e-HRM adoption comparison highlights a clear digital divide in higher education's adoption of digital process in operations. While universities in developed countries have made substantial progress in integrating e-HRM systems, those in Africa, particularly Nigeria, demonstrated constrained adoption.

Electronic human resource management (e-HRM) covers the application of information technology to deliver and manage HR functions more efficiently and effectively than traditional HRM. It integrates HR practices with digital platforms to improve accessibility and streamline activities such as recruitment, training, performance management, payroll, and employee engagement. In university systems, e-HRM is crucial in simplifying operations and enhancing organizational performance through centralized and secure management of employee records (Obama et al., 2020). A number of studies, such as Alhamad et al., 2022; Hosain, 2017; Varadaraj and Al Wadi, 2021, used e-self-service systems (ESS/MSS), e-HR records and information management (HRIS), e-salary payment system (e-SPS) to explicate the role of e-HRM in corporate performance. This study used e-recruitment, e-performance appraisal, and e-communication, as these dimensions are highly relevant for explaining the performance differences among federal universities in North-Western Nigeria.

The adoption of e-HRM in Nigerian federal universities has been gradual, with varying degrees of implementation and effectiveness across institutions. While some universities have made strides in integrating e-HRM systems to enhance administrative efficiency and decision-making, others face challenges that hinder full adoption. The challenges include inadequate funding as federal universities often struggle with limited budgets, prioritizing teaching, research, and infrastructure over administrative technology, which requires substantial financial investment for e-HRM software and staff training. Poor technological infrastructure with outdated hardware and software limits the maintenance of complex e-HRM systems due to poor internet connectivity, outdated IT equipment, and outdated systems. Limited technical expertise as many HR personnel and university administrators lack the technical skills needed to operate and manage e-HRM systems effectively. It is against this background, this study was conducted to investigate the electronic-human resource management practices and organizational performance of federal universities in north-western Nigeria with moderating effect of digital literacy.

Problem Definition and Hypotheses Formulation

Nigerian federal universities play a vital role in education, research, and innovation within challenging environment entrenched by inefficient traditional human resource management practices (Aleru, 2023). Traditional processes are prone to avoidable delays, errors, and transparency issues, which do hinder recruitment, development, and retention of key staff, and detracts from organizational performance. Effective adoption of e-HRM could address these issues by automating processes, improving decision-making, and enhancing service delivery (Ogunode & Emmanuel, 2023). Empirical studies by Bhatt and Poduval, 2023; Shamaileh et al., 2022; Elsayy, 2021; Obama et al., 2020; Umar et al., 2020; and Hosain, 2017 revealed inconsistent findings about the nexus between e-HRM and corporate performance. These conflicting results pose challenges in developing policy guidelines or frameworks for interventions, which implies existence of a conceptual gap. The current study, therefore, sought to explore digital literacy as a moderator variable, since the digital acumen of practitioners influences the implications of interventions for performance.

A number of extant literature, including Alqarni et al., 2023; and Umar et al., 2020, adopted organizational agility sustainable innovation, sustainable competitive advantage, e-selection, e-compensation, and +e-training as proxies for e-HRM on university performance. Assessing these intangible outcomes has inherent measurement complexities, exposing a methodological gap that this research addressed by aligning with broader goals to foster innovation and enhance global competitiveness for improved higher education quality. This informed the first hypothesis of the study:

HO1. Digital literacy does not have any significant effect on organizational performance of federal universities in north-western Nigeria.

Some prior works established inconsistent findings that continue to compel researchers to search for clear cause and effect relationships. For example, the studies of Alrifae, et al., 2026; Gbadebo, 2025; Asamoah-Appiah et al., 2024 established positive results while Alomaria, 2023; Elsayy, 2021; Hosain, 2017 found negative results with inadequate sample size determination for their studies. These inconsistent findings affect the refinement of key constructs and theoretical models, and as well limit the relevance for diverse contexts. Therefore, this study introduced digital literacy as moderator to test any conditional relationships, refine the theoretical postulates of real-world complexities, and validate or query existing models. The following hypotheses were explored to address these aspects of the research model:

HO2. E-Communication has no significant effect on organisational performance of federal universities in north-western Nigeria.

HO3. E-Performance Appraisal has no significant effect on organisational performance of federal universities in north-western Nigeria.

H04: E-Recruitment has no significant effect on organisational performance of federal universities in north-western Nigeria.

H05: Digital Literacy does not have significant moderating effect on the link between e-HRM proxies and organisational performance of federal universities in north-western Nigeria.

Conceptual Review

Organizational Performance

Organizational performance is a widely explored variable in numerous studies, though with varying definitions and measurements (Stannack, 2023). According to El-Borsaly and Hassan (2020), organizational performance connotes corporate capability to execute a particular strategy successfully and the collective output of employees' efforts. Kalogiannidis (2021) defined organizational performance as how effectively organizations perform their activities and meet desired objectives, meaning that actual outputs in terms of results should compare with expectations. This study conceptualized organizational performance as the federal universities' capacity to achieve goals, meet stakeholder expectations, and operate efficiently and effectively. Performance is multidimensional; it encompasses teaching and learning outcomes, research products, and community relevance. The Balanced Scorecard (Kaplan & Norton, 1992) and transformational leadership (Bryman, 2007) were adapted to measure performance across multiple dimensions in higher educational institutions, including academic outcomes, stakeholder satisfaction, financial health, internal processes, innovation, and growth.

Digital Literacy

Digital literacy is a broad and evolving concept (Bawden, 2008). Gilster (1997) described it as a combination of both technical and cognitive competencies necessary for effectively navigating the digital environment. This skillset enables individuals to access relevant information, connect with others, and engage in online communities for collaboration, innovation, and problem-solving. For Matindale et al. (2024) and Kabakus et al. (2023), digital literacy involves an individual's competence in discovering, accessing, managing, integrating, and critically evaluating digital content to produce new knowledge, create media outputs, and communicate ideas within organizational and everyday settings. Within higher educations, the cultivation of digital literacy among teachers, students, and other staff is vital for achieving digital transformation in practices and professional developments. For this study, digital literacy refers to ability of students, faculties, and other staff to effectively use digital tools, technologies, and platforms for teaching, learning, research, and administrative purposes. It encompasses skills, knowledge and attitudes for navigating, evaluating, creating and communicating information in a digitalised environment within appropriate ethical boundaries (Schallmo et al., 2017; Irielle, 2024; Xia & Zhang, 2024).

E-Human Resource Management Practices

In universities, e-HRM adoption presents an opportunity to improve both efficiency and organizational performance (AlHamad et al., 2022; Almashyakhi, 2022). E-HRM incorporates digital tools into a variety of HR operations, including recruitment, employee self-service systems, employee performance management, payroll management, and training. Khammadee (2023), stated that e-HRM refers to use of information technology for the design, execution, and facilitation of interactions among diverse actors performing HR tasks collectively. It relies on various internet-based tools and protocols to simplify and enhance human resource operations. Elsayy (2021) noted that e-HRM encompasses both administrative functions and strategic activities that contribute to organizational growth. Through the adoption of digital self-service platforms, organizations are able to deliver HR services efficiently to their workforce and leadership. This study considers e-HRM as the integration of digital technology and internet-based systems into HRM practices and processes to achieve efficiency of the organization's daily operations. The e-HRM proxies used in this study are e-recruitment, e-performance appraisal, and e-communication.

Review of Empirical Studies

Abdillah (2024) investigated the impact of e-recruitment on how attractive a company is perceived to be, taking into account the mediating effect of organizational reputation. The research included 213 participants from the fishing sector and utilized partial least squares structural equation modelling (SEM) for data analysis. The results indicated that e-recruitment significantly influenced the perceptions of recent graduates regarding the organization's attractiveness and reputation. While factors such as e-recruitment content quality, website design, and communication and feedback systems play a major role in shaping these perceptions. The findings help us understand how e-recruitment can increase an organization's attractiveness and how this has practical implications for companies in designing a website.

Adawiah and Putra (2024) examined how the implementation of e-recruitment affects company credibility, the efficiency of candidate selection, and process transparency from the viewpoint of job applicants. Through a descriptive methodology, the research revealed that e-recruitment significantly impacted all three aspects, showcasing its beneficial effects on company credibility, selection process efficiency, and transparency. The use of advanced technology in e-recruitment allows organizations to more effectively attract high-quality candidates, enhance the applicant experience, and streamline the selection process.

Dyke-Ebirika (2021), in his study investigated e-recruitment processes and organizational performance, noted that e-recruitment contributes positively to organizational growth by attracting competent and reliable candidates who improve organizational performance. The review recommended that organizations ensure adequate information technology systems and provide proper training for HR personnel to effectively implement e-recruitment and select employees who will drive performance.

Wejih and Opara (2024) carried out an assessment of the connection between electronic performance management and institutional productivity (organizational performance) within state-owned tertiary institutions in Rivers State, using a sample of 40 Human Resource Managers. By applying Spearman's Rank Order Correlation Coefficient at a significance level of 0.05, the research found a significant positive correlation between E-Performance Management and institutional productivity. The authors concluded that institutional management should adopt a comprehensive e-recruitment system to streamline the hiring process, enhance transparency, and expand access to a broader talent pool, thereby reducing reliance on conventional recruitment approaches. Ismawati and Sembiring (2022), Sumardjo et al. (2022) Wejih and Opara (2024)

Ismawati and Sembiring (2022) investigated the impact of e-performance, work engagement, and organizational culture on employee performance, with job satisfaction serving as a mediating variable. They analysed data from a sample of 143 hospital staff using descriptive statistics and path analysis through IBM SPSS Statistics. The results revealed that appraisals based on e-performance, employee engagement, and organizational culture each have a significant and positive direct effect on employee performance. Furthermore, these elements were also

shown to positively and significantly influence job satisfaction, which subsequently mediates the relationship between the independent variables and performance outcomes.

Sumardjo et al. (2022) explored the connection between workload, e-performance application, and employee performance, with job satisfaction functioning as a mediator, specifically among internal auditors in the digital banking sector. The study utilized a sample of 156 participants and employed Structural Equation Modelling via AMOS to validate the model. The findings confirmed that both workload and e-performance systems positively and significantly impact performance while also enhancing job satisfaction. Importantly, the research underscores how e-performance initiatives particularly those that provide performance-based incentives can effectively boost employee motivation, resulting in increased satisfaction and productivity levels.

Al-Aloosy et al. (2024) assessed the relationship between internet communication quality and productivity in the context of human resource management for construction projects. Drawing on responses from 248 individuals, the study employed Exploratory Factor Analysis to extract key variables and used AMOS for structural equation modelling. Results showed that the quality of internet communication significantly enhances labour productivity, with a high path coefficient of 0.92. However, labour resource management exhibited a negligible effect (-0.07), and the total impact of HRM variables on productivity was minimal (effect size of 0.05). The study underscores the pivotal role of digital communication tools in improving workforce output in construction environments.

Huda et al. (2023) explored the strategic role of trust in digital communication, focusing on its contribution to organizational sustainability. Their findings emphasized that building a secure digital communication space, driven by trust, is key to enhancing the quality of information shared. Burkšienė and Dvorak (2022), through content analysis, studied the e-communication practices of NGOs working on environmental issues in Klaipėda. They found that the e-communication capacity of these organizations is limited and fragmented due to insufficient financial resources, human capacity, and analytical capabilities. This often results in e-communication efforts that merely disseminate information or offer responses to proposals, without generating significant public reaction. Lastly, Jindal and Kaur (2021) investigated the relationship between social media use in the workplace and employee productivity. Based on data from 392 participants and employing SEM analysis, they found a positive link between social media engagement and productivity, as it encourages collaboration and the sharing of knowledge, leading to enhanced overall productivity.

Sitaniapessy et al. (2024) examined the influence of digital literacy strategies on enhancing the business performance of MSMEs in the Maluku province, conducting a survey involving 125 MSMEs across three city districts. Through structural model analysis utilizing AMOS SEM version 26, they determined that all three proposed hypotheses exhibited a positive and statistically significant impact on the business performance of MSMEs in the area. Zheng (2024) investigated the effects of innovation adoption, digital competencies, and digital literacy on the efficacy of management information systems, while also considering the moderating influence of organizational support, based on a sample of 305 SME owners in China. Employing Smart-PLS 4.00 for hypothesis testing, the findings indicated that although innovation adoption did not affect the effectiveness of management information systems, both digital competencies and digital literacy were significantly related to the system's effectiveness. Furthermore, the research found no moderating effect of organizational support on the relationship between innovation adoption, digital literacy, and the effectiveness of management information systems. The study concluded that increasing awareness of digitalization among employees and the general public could facilitate the transition of Chinese SMEs to new digital practices.

Chatterjee et al. (2023) explored the connection between digital workplaces and organizational performance, emphasizing the moderating role of digital leadership capability, with a sample of 335 participants from organizations undergoing digital transformation. The research employed the PLS-SEM technique for analysis and discovered that dynamic organizational capabilities positively affected digital workplace transformation, which in turn enhanced employees' work-life balance and led to improved performance. The study highlighted the essential role of digital leadership in propelling digital transformation within organizations.

Conceptual Framework

The conceptual framework illustrates the linkage between the independent and dependent variables under investigation. In this model, the E-Human Resource Management (e-HRM) serves as the independent variable, demonstrating its directional influence on organisational performance (OP), while digital literacy is the moderating variable. This framework reflects a direct and moderating relationship, emphasizing how the use of e-HRM potentially drives performance outcomes in OP.

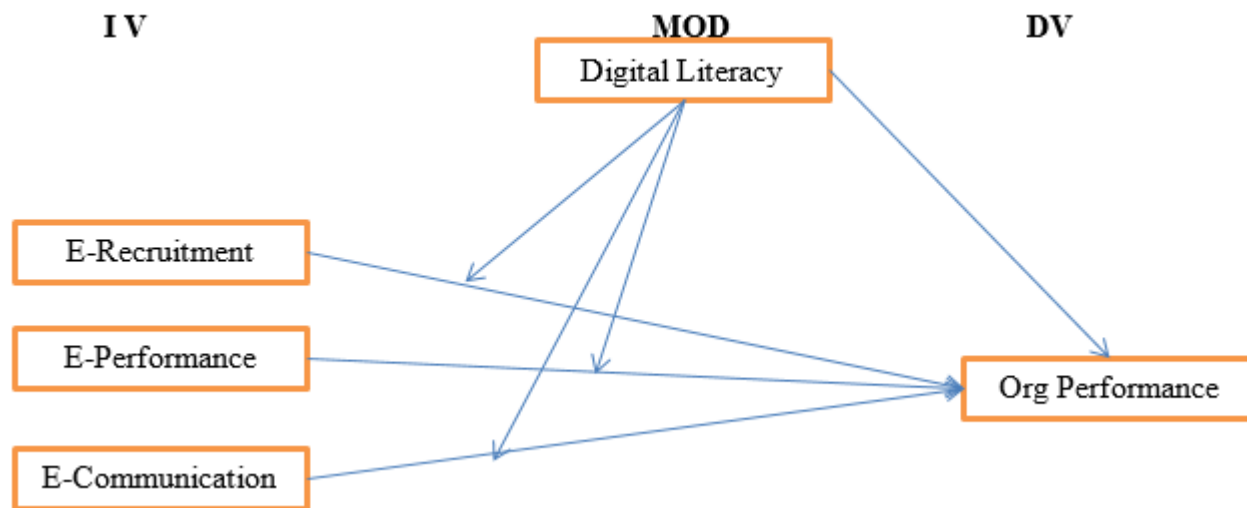


Figure 1 Conceptual Framework

Source: Researcher, 2026

Figure1 illustrates the conceptual framework for this study. The independent variable is E-Human Resource Management which is proxied by, E-Recruitment, E-Performance and E-Communication, the dependent variable is organizational. Performance and the moderator is digital literacy.

Theoretical Framework

The study integrated three theories - Technology Acceptance Model (TAM), Resource-based View (RBV), and Human Capital Theory (HCT) - to explain how electronic HRM practices translate into organizational performance outcomes, contingent on staff digital literacy.

Technology Acceptance Model

The Technology Acceptance Model first proposed by Fred D. Davis, an American academic renowned for his contributions to information systems (IS), technology adoption, and human-computer interaction (HCI) in 1989 posits that perceived usefulness and perceived ease of use influence users' behavioural intention to adopt new technologies. According to the TAM framework, user acceptance is predominantly determined by perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness (PU) is the degree to which employees perceive e-HRM systems as beneficial for improving their job performance, whereas perceived ease of use (PEOU) is the extent to which they find these systems user-friendly.

Users are more inclined to adopt a technology if they perceive it as beneficial to their performance, and they are more likely to embrace systems that are user-friendly and straightforward. Furthermore, a user's intention to utilize a system serves as a significant predictor of actual adoption, with users who maintain a favourable attitude towards the technology being more likely to interact with it. So, with reference to e-HRM, TAM explains employees' acceptance and use of technology based on perceived usefulness and perceived ease of use. It helps explain how HR professionals adopt and effectively use digital systems for HR activities. TAM has been applied

extensively in higher education research to explain the adoption of ICT systems, learning management platforms, and e-administration.

Within the context of e-HRM, TAM predicts that staff who perceive e-HRM tools as useful and easy to use are more likely to adopt them, which in turn influences organizational outcomes. Empirical studies in Nigerian federal universities have used TAM to explain lecturers' and librarians' uptake of e-resources and ICT-based services (Agbaje & Oladimeji, 2020; Bello & Hammed, 2024). These findings support the inclusion of TAM as a lens for understanding individual acceptance of e-HRM modules such as e-recruitment and e-performance appraisal.

The theory has been criticized by scholars (Legris et al., 2003; Benbasat & Barki, 2007) for placing excessive emphasis on the TAM within Information Systems research. They contend that, although TAM has greatly contributed to understanding technology adoption, its widespread dominance may have shifted focus away from other critical research areas, potentially giving a false impression of progress in knowledge development. Furthermore, it has been argued that TAM, despite its extensive application in studying technology adoption, tends to oversimplify the complexities of user acceptance.

To address this limitation, scholars have suggested incorporating additional variables to improve its explanatory power. This led to the development of the Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh et al. (2003) as an extension of the TAM. It incorporates factors like performance expectancy, effort expectancy, social influence, and facilitating conditions.

Since e-HRM involves digital platforms for HR functions for instance recruitment, training, performance appraisal, communication, salary payment and performance management, employees' digital literacy levels may influence how they perceive and interact with these systems (Falloon, 2020). As digital literacy is an individual's capacity to successfully navigate, assess, and use digital tools and technologies, in the context of federal universities, employees with high digital literacy may better understand e-HRM functionalities, leading to higher PU and PEOU, and adopt e-HRM more readily, resulting in improved organizational performance while encountering fewer system use challenges, thereby increasing efficiency and productivity (Eshet, 2004).

Resource-Based View

Resource-based view of Barney (1991) suggests that organizations gain a sustainable competitive advantage through unique, valuable, and hard-to-imitate resources and capabilities. This will tell on the organization's performance. E-HRM systems can be seen as strategic resources that improve efficiency, innovation, and decision-making, thereby enhancing performance. Resource-Based View argues that organizations gain competitive advantage through valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). Human capital, organizational routines, and technological capabilities are central RBV resources. In universities, e-HRM systems and staff digital competencies constitute strategic resources that can improve administrative efficiency and service quality. E-HRM practices such as e-recruiting, e-compensation, and e-training can be viewed as resources/tools that enable organizations to ensure this competitive advantage and engineer to gain the maximum outcomes (Almasradi et al., 2022).

Studies from Nigerian federal universities indicate that ICT infrastructure and staff ICT competencies are positively associated with administrative performance and research output (Fakandu & Yabagi, 2022; Saka, 2020). RBV thus frames e-HRM and digital literacy as strategic assets whose combined presence is expected to enhance organizational performance.

Human Capital Theory

Human Capital Theory (HCT) has emerged as a foundational concept in economics and organizational studies, positioning individuals' skills, knowledge, and experiences as crucial assets for enhancing productivity and economic performance (Awu & Darius, 2025). The foundations of human capital theory were laid by economists such as Gary Becker and Theodore Schultz, who posited that education and training increase individuals' productivity and earning potential, directly impacting economic growth (Becker, 1964; Schultz, 1961). It is a

central concept in economics and organizational studies that emphasizes the value of investing in individuals' skills, knowledge, and experience as a means of enhancing productivity and economic performance (Becker, 1964; Schultz, 1961). Becker (1964) argued that employees' skills, knowledge, and abilities contribute directly to organizational performance. Digital literacy is a form of human capital that enhances the effective use of E-HRM tools which in effect enhance organizational performance.

Despite its strengths, human capital theory has faced criticism over the years. Some critics argue that it may oversimplify the complexities of labour markets, ignoring structural factors that influence employment outcomes, such as discrimination and socio-economic barriers (Bowles & Gintis, 1975). Additionally, the measurement of human capital presents challenges due to the difficulty in quantifying skills and competencies that do not directly correlate with formal education (Gordon & Brewaele, 2018). Moreover, the rise of technology and automation raises questions about the future value of certain skill sets in the labour market. As AI and machine learning technologies continue to evolve, workers may need to adapt quickly to changes in job requirements, suggesting that the nature of human capital is more dynamic than previously understood (Brynjolfsson & McAfee, 2014). Nevertheless, human capital theory remains a pivotal framework for understanding the relationship between education, skills, and economic productivity. It underscores the necessity of investing in individuals' potential to drive economic growth and social progress.

METHODOLOGY

Research Design

The researcher employed quantitative survey to examine the relationships between E-HRM and organizational performance (OP), and the moderator, (DL). This was considered relevant as the purpose of the study was to delineate one or more factors that are causing another to vary (Sekaran & Bougie, 2013). It was thus expected that the findings would provide appropriate solution to the given problem from statistical patterns found (Bhatti, Hee, & Sundram, 2012). The survey was cross-sectional.

Population and sample of the Study

The population for this study were all faculty members and senior non-academic staff in federal universities within the Northwest of Nigeria. These comprise Kano, Kaduna, Katsina, Kebbi, Jigawa, Sokoto, and Zamfara states, and the target respondent population was nineteen thousand one hundred and thirty four (19,134). The study obtained a sample of 392, using the Yamane (1977) formula, and made a provision of 50% for attrition in line with Groves' (2006) guidance, equally supported by Cohen (1988) and Bryman and Bell (2015). The effective actual sample for the study was 448 respondents, and the data so collected was analysed to achieve the study objectives.

Method of Data Analysis

The data was analysed with Smart-PLS based multiple regression model. This was suitable in view of its capability in estimating path coefficients, evaluating relationships within measurement models, conducting bootstrapping algorithms, and analysing complex interactions among variables in structural equation modelling (SEM). The basic assumptions (Hair et al. 2010; Tabachnick & Fidell, 2019), for multiple regression analysis were appropriately satisfied by the data characteristics. The parameters of the model were estimated using the following multiple regression model:

$$OP = F(e\text{-HRM}) \dots \dots \dots (1)$$

Since:

$$e\text{-HRM} = ER, EPA, EC \dots \dots \dots (2)$$

It means that:

$$OP = \beta_0 + \beta_1 ER + \beta_2 EPA + \beta_3 EC + \beta_4 OP * ER + \beta_5 OP * EPA + \beta_6 OP * EC + \beta_7 OP * DL + \mu_t \dots \dots (3)$$

Where:

OP = Organisational Performance

ER = E-recruitment

EPA = E-performance Appraisal

EC = E-communication

DL = Digital Literacy (moderator variable)

β_1 — β_7 = Coefficients (parameters of relevance)

β_0 = Intercept

μ_t = Error Term (unobserved factors)

DATA ANALYSIS AND RESULTS

Internal Consistency Reliability

To assess the reliability of the measurement model, both Cronbach's alpha and composite reliability were employed to confirm that the observed indicators adequately represent their underlying constructs. Cronbach's alpha assumes equal indicator loadings, whereas composite reliability allows for differences in loading magnitudes (Hair et al., 2014). The combined use of these metrics ensures a thorough evaluation of reliability. Constructs were considered reliable if Cronbach's alpha exceeded 0.70 and composite reliability surpassed 0.708. The results in Table 2 indicate that all constructs satisfied these benchmarks, with alpha values ranging from 0.951 to 0.980 (Hair et al., 2014; Nunnally, 1978). Additionally, rho_A and rho_C values ranged between 0.952 and 0.983, further supporting reliability, with alpha values between 0.959 and 0.965 demonstrating strong internal consistency (Hair et al., 2014, 2018, 2021)..

Table 1: Reliability and Validity

Constructs and Indicators	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
Digital Literacy	0.956	0.956	0.964	0.818
Organizational Performance	0.980	0.980	0.983	0.879
e-Communication	0.951	0.952	0.961	0.803
e-Performance Appraisal	0.955	0.955	0.964	0.815
e-Recruitment	0.955	0.956	0.964	0.816

Source: Author's Computation (2026) using Smart PLS 4.0.9.9

Convergent Validity

This describes how well the set of indicators reflects the latent constructs by sharing a substantial amount of common variance (Hair et al., 2022; Fornell & Larcker, 1981). Convergent validity was assessed using the

Average Variance Extracted (AVE); as shown in Table 1, the AVE values for all constructs ranged from 0.803 to 0.879, indicating that roughly 84.1% of the variance in the indicators is explained by their respective constructs, thereby supporting validity of the measurements (Hair et al., 2014).

Discriminant Validity

The assessment of discriminant validity focuses on determining whether latent constructs are empirically distinct and free from excessive conceptual overlap. Discriminant validity was examined using the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio (HTMT). The Fornell–Larcker criterion also requires that the square root of each construct’s AVE surpasses its correlations with all other constructs in the model.

Table 2: Discriminant Validity

Variables	Fornell-Lacker Criterion					Heterotrait-Monotrait Ratio (HTMT)				
	DL	OP	e-CMM	e-PA	e-REC	DL	OP	e-CMM	e-PA	e-REC
DL	0.904									
OP	0.488	0.938				0.504				
e-CMM	0.031	0.442	0.896			0.035	0.457			
e-PA	0.041	0.457	0.007	0.903		0.046	0.471	0.028		
e-REC	0.046	-0.289	-0.056	0.02	0.903	0.049	0.298	0.06	0.03	

Source: Author’s Computation (2026) using Smart PLS 4.0.9.9

As presented in Table 2, the diagonal values are consistently greater than other correlates in each column. This pattern confirms that discriminant validity has been established for all constructs (Hair et al., 2022; Henseler et al., 2015). Moreover, all HTMT values are below the recommended threshold of 0.85, with values ranging from 0.03 to 0.504. This suggests that there is no significant overlap among the constructs, thereby establishing discriminant validity.

Structural (or Inner) Model

The structural model was evaluated to explore the relationships between electronic human resource management practices dimensions - e-Recruitment, e-Performance Appraisal and e-Communication and organisational performance. A bootstrapping procedure was applied in line with Hair et al. (2011, 2012, 2014, 2017) and Henseler et al. (2012). The evaluation focused on path coefficients (β), t-statistics, p-values, R^2 , Q^2 , and f^2 to assess the explanatory power and predictive relevance. The details are captured in figure 2.

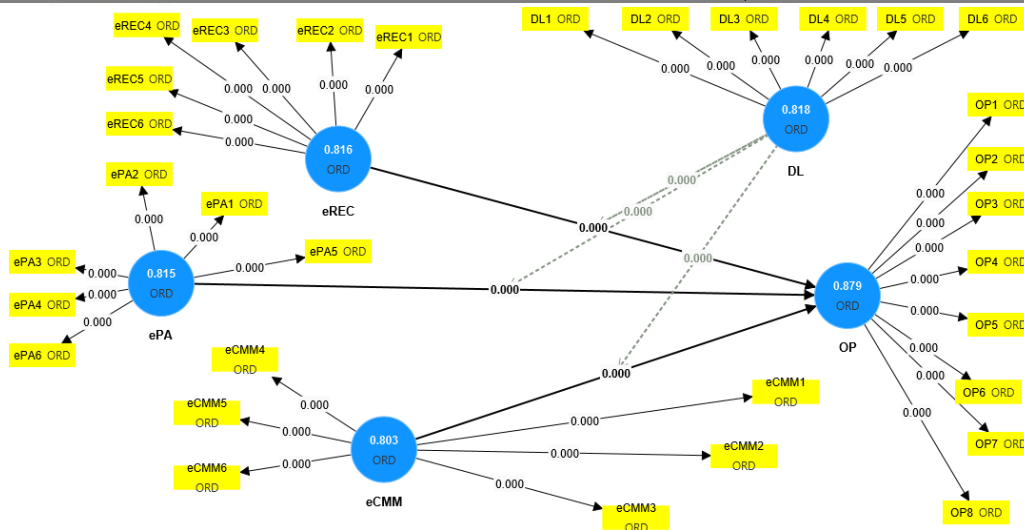


Figure 2: Path Diagram of Structural (Inner) Model

Estimation of the Direct Relationships

Consistent with the research hypotheses, Table 3 provides the estimated path coefficients (β), t-values, and significance levels for the relationships, Table 4 depicted the moderating interactions.

Table 3: The Direct Effects (Inner Model)

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Remarks
DL -> OP	0.483	0.483	0.027	17.596	0.000	Rejected
e-CMM -> OP	0.388	0.388	0.026	15.160	0.000	Rejected
e-PA -> OP	0.403	0.403	0.026	15.258	0.000	Rejected
e-REC -> OP	-0.281	-0.282	0.026	10.963	0.000	Rejected

Source: Author's Computation (2026) using Smart PLS 4.0.9.9

The a-priori expectation of the study was that electronic human resource management practices' proxies of e-recruitment, e-performance appraisal and e-communication have significant positive affect on the institutions performance. However, the empirical results presented in Table 4.6 indicate that H01, H02 and H03 were supported, confirming a significant relationship between digital literacy and performance of federal universities in North-Western Nigerian. The positive beta coefficients suggest that an increase in digital literacy enhances the universities' performance by at least 38.8%. Nevertheless, the evidence in Table 3 shows that e-recruitment has a statistically significant negative effect on performance (HO4). The negative beta tend to imply that e-recruitment should be de-emphasised to strengthen performance decreased.

The Moderating Relationship

Table 4 shows analytical of the moderating effect as hypothesized (HO5).

Table 4: The Moderating Effects (Inner Model)

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Remarks
DL x e-REC -> OP	-0.143	-0.142	0.022	6.453	0.000	Rejected
DL x e-PA -> OP	0.201	0.200	0.022	8.964	0.000	Rejected
DL x e-CMM -> OP	0.172	0.172	0.020	8.426	0.000	Rejected
R-Squared	0.778					
Adjusted R ²	0.774					
F ² effect size	0.345 - 1.020					

Source: Author's Computation (2026) using Smart PLS 4.0.9.9

The results show that digital literacy has significant moderating influence on the relationship between e-HRM and performance of the universities. Where the direct link was positive, the moderator accentuated the contribution. Similarly, the negative interaction of electronic recruitment and performance was equally magnified by digital literacy. The $R^2 = 77.8\%$, and adjusted $R^2 = 77.4\%$, indicated that the research model has substantial explanatory power (Hair et al. 2022). On average, the relative contribution (denoted by F^2) of the exogenous constructs to the explained variance in the universities' performance was large, effects range from 34.5% - 102.0%. These results highlight the relative importance of each predictor in the structural model.

DISCUSSION OF THE FINDINGS

The aim of this study was to explore whether digital literacy moderates the relationship between electronic human resource management practices and organisational performance, electronic human resource management practices was measured through its dimensions of electronic recruitment (e-REC), electronic performance appraisal (e-PA) and electronic communication (e-CMM). This used hypothesis testing and the moderation theory by Hair et al. (2014), the study assessed the direct effects of these dimensions on organisational performance through the moderator, digital literacy.

The digital literacy has a positive and statistically significant effect on organisational performance. The result suggested that employees' ability to effectively use digital tools, technologies, and information systems plays a crucial role in enhancing overall organisational outcomes. This means that organisations with a digitally competent workforce are better positioned to improve efficiency, innovation, decision-making, and service delivery. This study aligned with Technology Acceptance Model (TAM) developed by Fred Davis, which states that individuals' perceived usefulness and perceived ease of use of technology influence their acceptance and utilization of digital systems. This study also corroborated with previous literatures (Chatterjee et al., 2023; Sitaniapessy et al., 2024; Zheng, 2024) who revealed that digital literacy has positive and statistically significant effect on organizational performance.

Electronic communication has a positive and statistically significant effect on organisational performance. This means that effective use of digital communication tools like emails, intranets, enterprise platforms, and messaging systems improves coordination, information sharing, and decision-making within organisations. This suggests that organisations that leverage electronic communication systems are more likely to experience improved efficiency, faster response times, and better overall performance outcomes. The finding also aligns with Media Richness Theory, propounded by Richard L. Daft and Robert H. Lengel which revealed that communication effectiveness depends on the richness of the communication medium. The current study is in

consistent with previous studies (Al-Aloosy et al., 2024; Huda et al., 2023; Jindal & Kaur, 2021) who found that electronic communication systems enhance organisational performance.

The result shows that electronic performance appraisal has a positive and statistically significant effect on organisational performance. This means that the adoption of digital appraisal systems enhances the effectiveness, transparency, and objectivity of performance evaluation processes. This suggests that organisations that implement electronic appraisal systems are better able to monitor employee performance, provide timely feedback, and align individual goals with organisational objectives, thereby improving overall performance. The Resource-Based View theory by Jay Barney provides support for this study. This is because electronic performance appraisal systems enhance HR functions by supporting efficient workforce management, informed decisions, and talent development, which contribute to higher organisational performance and long-term competitive advantage. The current study aligned with previous scholars (Ismawati & Sembiring, 2022; Sumardjo et al., 2022; Wejih & Opara, 2024). Who revealed that electronic performance appraisal has a positive effect on organisational performance

Electronic recruitment has a negative but statistically significant effect on organisational performance. Although the e-REC system is widely used and influential, its current implementation in the University system may be associated with unintended inefficiencies or challenges that reduce organisational performance. The statistical significance indicates that this negative effect is robust and not due to chance, highlighting a meaningful but adverse relationship. Based on the Technology Acceptance Model (TAM) by Fred Davis, the effectiveness of e-recruitment depends on how easy and useful users perceive it to be; if the system is complex or unreliable, it may reduce efficiency and negatively impact organisational performance. The current study findings do not align to any of the prior studies.

The moderating role of digital literacy on the relationship between electronic recruitment and organisational performance is negative yet statistically significant. This suggests that digital literacy is important, higher levels of it may weaken the positive contributions of e-recruitment or intensify its negative effects on organisational performance. The statistical significance indicates that this moderating effect is robust and meaningful. This study is inconsistent with over qualification Theory which provides insight into this relationship. The theory stressed that highly digitally literate employees may feel that basic or poorly optimized e-recruitment systems do not match their skill level, leading to dissatisfaction, reduced engagement, or resistance. This can weaken the expected benefits of e-recruitment and contribute to lower organisational performance. The present study is in line with Zheng (2024) study which found that digital literacy has no moderating relationship between electronic recruitment and organisational performance.

Digital literacy has positive moderating relationship between electronic performance appraisal and organisational performance. This indicates that higher levels of digital literacy strengthen the effectiveness of e-performance appraisal systems in improving organisational outcomes. In other words, the impact of e-PA on performance becomes more pronounced when employees possess strong digital skills. The finding is supported by Human Capital Theory, associated with Gary Becker. Who stated that digital literacy represents a critical form of human capital that improves employees' ability to leverage digital tools. The current study corroborated with previous studies (Chatterjee et al., 2023; Sitaniapessy et al., 2024) who stated that Digital literacy has positive moderating relationship between electronic performance appraisal and organisational performance

Digital literacy plays a positive and significant moderating role in enhancing the effect of electronic communication on organisational performance. This means that higher levels of digital literacy enhance the effectiveness of electronic communication in improving organisational outcomes. In order words, electronic communication tools contribute more strongly to organisational performance when employees possess the necessary digital skills to use them efficiently. The result also aligns with Complementarity Theory, which posits that the combined use of resources yields greater benefits than using them independently. In this case, digital literacy and electronic communication systems complement each other while the systems provide the platform for interaction, digital literacy ensures effective usage. The current study is in consistent with previous studies (Chatterjee et al., 2023; Sitaniapessy et al., 2024) who stated that Digital literacy has positive moderating relationship between electronic communications on organisational performance.

CONCLUSION

The study findings concludes that even though e-recruitment exhibits a negative yet significant relationship with organizational performance, digital literacy, e-performance appraisal, and e-communication show positive and significant effects. This implies that greater digital literacy among staff enhances their proficiency in utilizing e-HRM systems. Additionally, e-performance appraisal contributes to more effective evaluation processes, improving productivity and accountability, while e-communication ensures better information flow, coordination, and decision-making. In light of these findings, the following recommendations are presented.

Recommendations

The study recommends as follows: -

- i. The universities should establish technical support and mentoring systems to ensure staff continuously improves their digital capabilities and adapt to evolving technologies.
- ii. The universities should strengthen electronic communication systems by adopting reliable and integrated digital platforms to enhance information flow across departments.
- iii. The management of the higher institutions should link e-performance appraisal outcomes to rewards, promotions, and development programs to boost employee motivation and productivity and to ensure it remains relevant, reliable, and aligned with organizational goals.
- iv. The universities should integrate e-recruitment with other HR functions and establish monitoring mechanisms to identify gaps and continuously improve the recruitment process.
- v. The management of universities should continuously upgrade both staff digital skills and communication technologies to sustain and strengthen performance outcomes.

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