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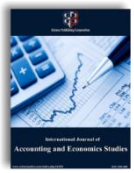

The Impact of Electronic Human Resource Management on Business Performance: The Mediate Moderate Model

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Abstract

This paper will focus on the role played by the electronic human resource management (E-HRM) in business performance using a combined mediate-moderate model. The study examines the immediate effect of E-HRM practices on the outcome and measures the mediating force that strengthens the relationship and the moderating force that changes the strength of the relationship. There were five hypotheses that were formulated to explain the role of E-HRM in enhanced performance in digitally inclined and fast-paced trading environment. The research design used was the quantitative descriptive method of study, where 387 valid responses were obtained by distributing 500 questionnaires. The results show that E-HRM is positively related to the performance of the business, and the mediating construct enhances the impact since it increases the strength of internal processes associated with digital workflow, decision accuracy, and consistency of operations. The moderating variable also has an effect on the relationship as it increases or decreases effectiveness of E-HRM based on the degree of the moderating variable within the trading environment. This study benefits the literature that exists by presenting E-HRM as a resource that can facilitate the progress of performance by digital structuring, better responsiveness, and operational alignment. It further highlights the concurrent nature of the role of mediation and moderation in creating flexibility and business lasting leverage. The limitations and future study directions are provided in the conclusion.

Keywords: *Operational E-HRM; Relational E-HRM; Transformational E-HRM; Business Performance; Artificial Intelligence; Quality of Accounting Information Systems.*

1. Introduction

In the modern digital economy, organizations are increasingly adopting the new advanced system of technology so as to maximize performance, responsiveness, and competitiveness in their various functional areas. Human resource management (HRM), as a fundamental organizational activity, has experienced a radical change towards digitalization, especially with the adoption of electronic human resource management (E-HRM). E-HRM hastens the automation of HR processes and services and enables organizations to have more precise and timely information to make strategic decisions. These changes are transforming the operational, relational, and transformational HR processes carried out in the contemporary business realm, particularly those that experience great change, like the trading business. Concurrently, the digital innovations in the field of artificial intelligence, analytics, mobile technology, and cloud-based systems are shaping the way traders conduct their business operations. Since the trading activity is based largely on quick decision-making, information flow, and the interactions within the digital markets, E-HRM has gained the status as a highly valuable tool in facilitating the performance of the traders. Its purpose goes beyond the simplification of the administrative procedures to the increase of collaboration, learning, and strategic alignment of the workforce. However, the degree to which E-HRM is relevant to the performance of a business and how this occurs is a field yet to be delved into. The performance of a business is based on precise information, efficient workflow, and is ability to respond swiftly to the changes in the market. In this context, the role of mediation, including internal digital capability, operational alignment, or AI-enabled process enhancement, could be helpful in raising the impact of E-HRM on the outcomes of performance. Similarly, the moderating effect of system-level characteristics, e.g., the quality of accounting information systems, can dictate the magnitude of E-HRM effects by influencing the reliability, data accuracy, as well as transparency in transactions. Despite the potential that digital HR tools have in performance improvement, empirical research on these two mechanisms is scarce. In this study, a mediate–moderate model refers to an integrated analytical framework that simultaneously incorporates both mediation and moderation mechanisms within a single structural model. Mediation explains the underlying process through which an independent variable influences a dependent variable by transmitting

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its effect through an intervening construct. Moderation, in contrast, specifies the conditions under which the strength or direction of this relationship changes depending on the level of a contextual variable. Accordingly, the present model examines how Electronic Human Resource Management (E-HRM) affects business performance through Artificial Intelligence as a mediating mechanism, while the Quality of Accounting Information Systems conditions the strength of these effects as a moderating factor. The adoption of E-HRM within the trading settings is a growing research topic, but there still exist some gaps. To begin with, the literature lacks the presence of studies that would study E-HRM in trading sectors, where digital workflow, fast processing, and coordination of employees are of paramount importance to the competitive advantage. Second, little focus has been put on how mediating mechanisms can enhance the impact of E-HRM on performance. Third, even though studies have shown that the quality of the system has a moderating effect on digital and E-HRM outcomes, few studies have examined the moderating role played by accounting information system quality in E-HRM-performance associations. Fourth, most studies have been carried out in conventional corporate or manufacturing contexts, and there is a gap in the E-HRM practices among traders and market actors. Lastly, the theoretical progress is still lacking in terms of how digital HR capabilities can influence business performance in the context of high-paced trading. Consequently, the present research aims at exploring the effect of electronic human resource management on business performance using a mediate-moderate model. The research assesses the effectiveness of E-HRM in improving business performance, the intervening variable that promotes this connection, and the quality of accounting information systems that moderate the impact of E-HRM on performance. Through these gaps, the study will help to fill the emerging discussion on the connection between digital HR practices, artificial intelligence, system quality, and business performance in dynamic trading settings. The research questions used in the study are based on the research gaps identified and include:

1) What is the level of effect of electronic human resource management on business performance?
2) What is the mediating variable that is reinforcing the E-HRM and business performance relationship?
3) What role does accounting information system quality play in the effectiveness of E-HRM under trading conditions?
4) Does the moderating variable change the correlation between E-HRM and performance?
5) What is the contribution of the mediate mechanism plus moderate mechanism to the better-performing traders?

The research questions are directly associated with the conceptual framework and hypotheses, as they provide a systematic way of investigating the role of digital HR capabilities and system-level variables in facilitating performance in modern-day trading activities. In this vein, this paper commences with Section 1: Introduction. Section 2 will include a review of the literature concerning the topics related to E-HRM, business performance, artificial intelligence, and the quality of accounting information systems. Section 3 describes the development of the conceptual framework and hypothesis. The methodology of the research is described in Section 4. Section 5 provides the data analysis and results. Section 6 talks about the theoretical and practical implications. Section 7 finally concludes the study by giving future research recommendations.

2. Literature Review

Electronic human resource management (E-HRM) is now regarded as a necessary part of organizational development in the digital world, particularly in the spheres of trading, which is dynamic and information-intensive. Although E-HRM is sometimes associated with more extensive digitalization processes, it should also be noted that it has a unique role to play in defining Hr functions, operational processes, and business performance. E-HRM is a narrower use of digital technologies in HR, and the digital transformation is the structural, cultural, and technological changes throughout the organization. This difference offers some clarity in the analysis of the role of E-HRM on business performance, artificial intelligence-related improvements in E-HRM processes, and the moderation of these impacts by the quality of accounting information systems.

The subsections below discuss the core constructs of the study according to the research model.

2.1. Operational E-HRM

Operational E-HRM can be characterized as the digitalization of administrative and routine HR functions, and it allows companies to automate the processes, minimize manual errors, and enhance service delivery. Such a dimension encompasses e-recruitment websites, e-payroll services, e-attendance services, and human resource self-service websites. Automation helps companies to reduce the requirements of time and effort to perform repetitive human resources tasks and redirect their attention to more strategic areas.

Researchers underscore the fact that operational E-HRM saves on administrative overheads and increases continuity and precision of HR activities by entrenching data-driven decision-making tools in routine operations. Online tools facilitate immediate access to the employee database, standardization of HR processes, and human bias in management. Operational E-HRM leads to better performance in a trading environment through the provision of access to staffing information at the right time, keeping track of attendance precision, and aiding compliance through the implementation of swift trading operations.

Intelligent automation also contributes to the operational E-HRM by allowing automated screening, prompt data processing, and automatic identification of patterns in the behavior and performance of employees. Such capabilities create insights that can assist traders to run daily operations more effectively, enhance speed and quality of decision-making in all trading activities. In general, operational E-HRM is a supporting digital instrument which allows companies to optimize the efficiency of HR and contributes to the overall positive business results.

2.2. Relational E-HRM

Relational E-HRM is based on the applications that promote communication, interaction, and collaboration between workers. The most important relational aspects are e-training systems, online performance management systems, online digital communication channels, as well as talent management systems. These solutions reinforce the engagement of employees as they provide unlimited access to learning materials, digital communication, and data-driven performance measurement.

It has been demonstrated that relational E-HRM leads to better workforce collaboration, transparency when assessing performance, and skills development via digital learning settings. Relational E-HRM in the trading sector enables the employee to get prompt feedback, take online training courses, and have access to advanced decision-support software, which is paramount in a trading environment where coordination and information exchange become vital.

The relationship E-HRM is reinforced with AI applications due to their ability to personalize training and adaptive learning modules, as well as predictive systems that help detect skills gaps and propose specific developmental programs. Such innovations create a more

interconnected and competent labor force, enhancing the sensitivity of traders to market requirements and increasing the overall business performance.

2.3. Transformational E-HRM

Transformational E-HRM is a concept oriented towards digital options, facilitating innovation in organizations, long-term planning, and making strategic decisions based on data. This dimension will include HR analytics, strategic workforce planning systems, and AI-based HR dashboards that can assist organizations in managing talent, predicting staffing requirements, and aligning human resource strategies to business goals.

According to scholars, transformational E-HRM changes the role of HR from an administrative support to a strategic leader in using analytics and digital intelligence to drive change within organizations. Through workforce data analysis, organizations are able to forecast turnover, performance trends, and help plan talent in the future.

Transformational E-HRM in the context of the trading business allows the organization to participate in digital markets, react to new technologies, and maintain the competencies of the workforce in accordance with the strategic direction. The AI-based analytics facilitate decision-making through workforce prediction, better scenario planning, and responsiveness to changing trading conditions.

Transformational E-HRM, consequently, constitutes the core of the strategy of E-HRM that enables organizations to become digitally intelligent to stay competitive in the long term.

2.4. Business performance

Business performance refers to the capability of traders to achieve operational effectiveness, quality of decisions, profitability, and sustainable business performance in virtual markets. The trading environment demands high levels of dynamism and competition, whereby the performance is anchored on speed of information processing, coordination, and availability of the right operational data.

The performance of the business directly depends on E-HRM as it assists in coordinating the business tasks, reducing the time of administrative processes, supporting the further development of skills, and preparing the employees. The research shows that digital HR practices may assist traders to attain enhanced communication, speeded-up workflow, and employee competency to the level of supporting improved and timely trading decisions.

Additionally, strategic and relational aspects of E-HRM can help traders to provide an option to cooperate, professionally evolve, and make informed choices based on data. These abilities improve the ability of the traders to operate in uncertainties, in the event of needing agility and digital prowess in the maintenance of the competitive advantage.

2.5. Artificial intelligence (AI)

AI has become one of the fundamental forces behind E-HRM development, allowing the automation of HR processes, analytics, and digital intelligence. The AI technologies assist in the automation of the recruitment process, predictive analytics, performance analysis, and training solutions. Researchers underline the idea that AI can also make HR decision-making more efficient because it gives real-time information, eliminates human error, and makes the evaluation of employees more precise.

Applied in trading, AI will facilitate the realization of competency gaps, automation of workforce operations, and simplified decision-making. AI applications process big data to identify trends, predict employee behavior, and increase the business readiness to act in high-speed situations. The mediating mechanism in this study is also assisted by AI, which enhances the digital capabilities that connect E-HRM to business performance.

2.6. Quality of accounting information systems (QAIS)

The digital environments have a moderating factor of accounting information systems quality, which is the factor that determines the reliability, accuracy, and usability of financial and administrative data. The quality of the accounting information system is to provide timely reporting, transparency of the data, and to ensure the security of the transactional processes, which strengthens the organizational confidence in the digital working processes.

Research points out that properly functioning accounting information systems assist in decision making, the reduction of errors in operations, and communication among functional areas. High system quality in the trading sector would provide proper financial records, real-time updates on the trading activities, and safe storage of the information pertaining to the employee and financial information.

In combination with E-HRM, high-quality accounting information systems enhance the efficiency of digital HR practices in terms of integration of data into a seamless system, reliability of systems, and better reporting accuracy. Therefore, QAIS mediates the association between E-HRM and business performance by maximizing the advantages of digital HR tools in settings where credible financial and operational data is the key to business prosperity.

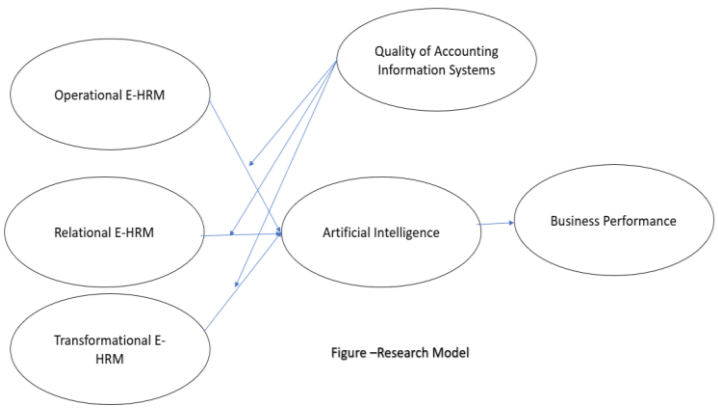


Figure –Research Model

3. Hypothesis Development

Strategically, the dynamic capabilities theory (DCT) describes how organizations perceive the opportunities and threats of turbulent environments, utilize them by acting timely manner using digital processes, and reorganize the internal processes to maintain competitive advantage. Based on this framework, the dynamic capabilities indicate the capacity of an organization to renew, extend, and remodel its resource base with the aim of responding to the ever-changing business environment. The three dimensions of electronic human resource management are operational E-HRM, relational E-HRM, and transformational E-HRM, which are conceptualized as significant digital resources that assist the functioning of organizations in the trading environments that are dynamic and busy. These systems will automate the HR processes, enhance internal communication, and give strategic insights, which eventually will lead to better performance of the business. Nevertheless, the availability of digital HR tools is not sufficient to achieve better business results unless organizations also have the relevant system-level requirements to use and take advantage of them. In this respect, quality of accounting information systems (QAIS) serves as a significant contextual mechanism that will dictate whether the E-HRM practices will be translated into significant performance benefits. The accounting information systems are of high quality, which guarantees that the accounting information is accurate, transparent, and reliable in financial and operational data. This enhances the role played by E-HRM tools in enhancing the performance of trader businesses in terms of consistency of the data and facilitating timely decision-making. The current model thus makes E-HRM the strategic input, trader business performance the main output in the organization, and the quality of accounting information systems a mediating variable that boosts or diminishes the efficacy of digital HR dimensions. The model is indicative of the DCT view, where digital tools are only used to help performance when they resonate with the complementary organizational technological and informational capabilities.

3.1. The impact of operational E-HRM on trader business performance

Operational E-HRM is the digitalization of administrative HR functions in recruitment, attendance management, payroll management, and employee record management. These tools also automate routine work and ease the administrative load, besides assisting in the proper handling of data. According to the scholars, the operational E-HRM improves the performance of a business because it allows organizations to become more efficient, cost-effective, and more reliable in their daily HR practices.

In traders who were working in very dynamic markets, operational E-HRM helps in expediting the internal processes, proper staff scheduling, leading to a reduction of operational delays and consequently leading to better business performance. Prior studies consistently indicate that the automation of routine HR processes enhances operational efficiency, reduces administrative costs, and improves process reliability, particularly in digitally intensive environments. These findings suggest that operational E-HRM contributes directly to performance outcomes by streamlining workflows and minimizing execution delays in fast-paced trading contexts.

H1: Operational E-HRM has a positive and significant impact on trader business performance.

3.2. The impact of relational E-HRM on trader business performance

Relational E-HRM is dedicated to the digital-assisted communication, learning, and relationship-based HR activities. It incorporates e-learning, digital performance management systems, a communication system, and an interactive employee portal. Studies have shown that relational E-HRM helps in improving coordination, employee engagement, and the development of the workforce.

Relational E-HRM has been effective in the trading field by improving teamwork, speed of information sharing, and perpetual learning, aspects that promote decision-making and operational flexibility in the hands of the traders. Existing research emphasizes that digital HR systems supporting communication, training, and performance feedback enhance employee coordination, engagement, and responsiveness. In information-intensive trading environments, such relational mechanisms are shown to facilitate faster information exchange and collaborative decision-making, which are critical drivers of business performance.

H2: Relational E-HRM has a positive and significant impact on trader business performance.

3.3. The impact of transformational E-HRM on trader business performance

Transformational E-HRM is a set of digital systems to facilitate long-term planning, talent plans, and data-driven workforce choices. These systems employ analytics, strategic dashboards, and AI-powered tools in order to enhance forecasting, workforce alignment as well and strategic HR decision-making. To traders, transformational E-HRM reinforces the strategic preparedness, increases flexibility to market variation, and the ability to build long-term capacity, and finally leads to better business performance. The literature on strategic HR digitalization highlights the role of analytics-driven workforce planning, talent forecasting, and strategic alignment in building long-term organizational capability. These studies suggest that transformational E-HRM influences business performance by enabling data-driven strategic decisions and enhancing organizational adaptability.

H3: Transformational E-HRM has a positive and significant impact on trader business performance.

3.4. The impact of the quality of accounting information systems on trader business performance

The quality of accounting information systems (QAIS) determines the integrity, reliability, and usability of financial and transactional information. High-quality systems enhance organizational transparency, improve reporting accuracy, and support informed decision-making.

In trading environments, where decisions depend heavily on real-time data, reliable accounting information systems contribute directly to better performance by reducing errors, improving forecasting, and strengthening financial control mechanisms. Prior accounting and information systems research demonstrates that high-quality accounting information systems improve decision accuracy, financial transparency, and operational control. In trading environments characterized by rapid transactions and information asymmetry, such system quality is consistently associated with superior performance outcomes. Contingency-based and dynamic capability perspectives suggest that the effectiveness of digital HR practices depends on the quality of complementary information systems. Accounting information system quality, therefore, is expected to condition the extent to which E-HRM practices translate into performance gains by shaping data reliability, integration, and decision confidence.

H4: The quality of accounting information systems has a positive and significant impact on trader business performance.

3.5. Moderating role of QAIS on the relationship between operational E-HRM and business performance

Operational E-HRM helps to increase the efficiency of operations internally, although it may be based on the quality of the financial and administrative information on which daily trading operations are based. Good accounting systems mean that the payroll data is good, the cost data is good, and the reporting is good. This enhances the working effect of E-HRM and decision-making.
Therefore, the quality of accounting information systems increases the returns of operation E-HRM towards elevated levels of trader business performance.
H5: The quality of accounting information systems positively moderates the relationship between operational E-HRM and trader business performance.

3.6. Moderating role of QAIS on the relationship between relational E-HRM and business performance

Relational E-HRM enhances communication and coordination- but again, its efficiency requires the accuracy and reliability of the financial and operational data shared among employees. The quality of the accounting information system can add value to the relational E-HRM by increasing transparency, enabling real-time teamwork, and supporting internal communication.
Within such environments, relational E-HRM interaction with system quality results in a better business performance, particularly in data-based trading processes.
H6: The quality of accounting information systems positively moderates the relationship between relational E-HRM and trader business performance.

3.7. Moderating role of QAIS on the relationship between transformational E-HRM and business performance

Transformational E-HRM assists in strategic planning and HR development toward the future. Its efficiency is always enhanced in situations where the quality of accounting information systems delivers dependable financial and operational insights to long-term planning. Quality data enhances the strategic forecasting, risk evaluation, and the matching of human resources. Thus, an effective accounting information system can maximize the strategic role of transformational E-HRM on the business performance of traders. Strategic HR and accounting literature emphasizes that high-quality accounting systems enhance the effectiveness of long-term planning and analytics-driven HR initiatives, implying a complementary interaction between QAIS and transformational E-HRM.
H7: The quality of accounting information systems positively moderates the relationship between transformational E-HRM and trader business performance.

4. Research Methodology

The sampling method used in the study was a stratified random sampling in order to have a varied representation across the trading-related contexts. The categories of traders were used to define the strata; these were retail traders, wholesale traders, financial market traders, e-commerce traders, and service-oriented trading firms. The inclusion criteria included in the selection of the organizations were as follows:
1) They carry out their activities in the Jordanian trading environment in a formal manner.
2) Have a minimum number of staff involved in trading or trading support activities.
3) Have introduced or are in the process of introducing electronic human resource management (E-HRM) tools in their operation.
4) Use accounting information systems to report on financial and operational.

The proposed stratification methodology guaranteed the detailed coverage of the role of E-HRM impacting the business performance of traders via mediation-moderation hypotheses in the study. In this manner, the hypotheses were formulated and measured in the form of a quantitative parameter collecting numerical data and implementing statistical tools to analyze the dependencies between operational E-HRM, relational E-HRM, transformational E-HRM, trader business performance, artificial intelligence, and quality of accounting information systems. The cross-sectional survey design was used to gather data at one time only, which is appropriate to determine the effect of digital tools of HR on trader performance and the moderating role of accounting information systems. The method will enable gathering of data on a large sample in various trading sectors, and will enable the analysis of relationships among variables to be strong. The population of the study was divided into business owners, trader supervisors, HR officers of trading companies, and administrative and financial personnel having a direct relation to business trading. There was a stratified random sampling process ensuring equal representation of the retail, wholesale, financial market, e-commerce, and service traders. The Cochran formula was applied in calculating the necessary sample size (margin of error of 5% and confidence level of 95). The sample size calculated was 385 respondents as the minimum sample size. The sample size was raised to 500 to achieve sufficient statistical power and to counter the influence of the possible non-response or partial submission. The structured questionnaire was administered to gather data; in the questionnaire, closed-ended items with measures in the form of the 5-point Likert scale were implemented (strongly disagree, strongly agree, etc.). The survey was carried out through electronic transmission via Google Forms to other people in various fields of trade. Sampling frame was created on the basis of publicly accessible commercial directories, databases of the Ministry of Industry, Trade and Supply, and industry-based directories of retail and financial traders. The companies were contacted using email and phone to confirm the existence of E-HRM tools and accounting information systems before they were included. Random selection in each trading stratum was done through a random number generator from a list of eligible participants who were numbered. Among the 500 questionnaires that had been handed out, 387 valid questionnaires were received, and this is a response rate of 77.4%. Representation was kept in the sectors: retail traders (n=80), wholesale traders (n=76), financial market traders (n=78), e-commerce traders (n=75), and service-based trading firms (n=75). Preexisting literature in terms of a validated scale was modified in this research. Operational, relational, and transformational E-HRM measures were based on the existing E-HRM models that evaluate the digital HR practices. The performance of the trader's business was found by the indicators that are related to their profitability, accuracy of the decision, efficiency of the process, and responsiveness in the trading conditions. The use of artificial intelligence was measured using the past scales that tested the digital decision-support and automation tools. The quality of the accounting information system was gauged by evaluating criteria that determined the accuracy, timeliness, data integrity, and quality system integration. In order to achieve content validity, the items of the questionnaire were reviewed by the domain experts of HRM, digital systems, and trading operations, to check the relevance and suitability. Construct validity was established using exploratory and confirmatory factor analysis, and the indicators loaded in their theoretical constructs. The level of reliability was determined by determining Cronbach's alpha, whose value above 0.70 showed good internal consistency. Ethics were put into consideration. The participants were told about the nature of the

study, they were made to believe that their answers would not be used against them, and they were made aware that the collected data would not be used in any other way, except academically. There was no collection of personal identifiers, and absolute anonymity was guaranteed. Such a methodology design was able to support the strength of data collection and analysis, offering a strong base in testing the mediation-moderation model between E-HRM, artificial intelligence, the quality of accounting information systems, and trader business performance.

5. Data Analysis

Internal consistency reliability, convergent and differentiating validity were used to test the reliability and validity of the measurement model. The internal consistency reliability was evaluated using Cronbach's Alpha (rho a) and composite reliability (rho c), whereas the convergent validity was measured with the help of the average variance extracted (AVE). The rho a values were all greater than the recommended value of 0.7, which was a good indicator of strong internal consistency between constructs. On the same note, the values of rho c on all variables were greater than 0.7, which validates sufficient reliability in the scales. Besides, the AVE of all constructs was high in terms of exceeding the acceptable level at 0.5, which indicates satisfactory convergent validity. Given the very high explanatory power of the model for Business Performance (Adjusted $R^2 = 0.913$), additional diagnostic tests were conducted to assess potential model overfitting and common method variance, following established PLS-SEM recommendations. The results indicate that all VIF values fall below the conservative threshold of 3.3, suggesting that multicollinearity and common method bias are unlikely to distort the estimated relationships. In addition, Harman's single-factor test was employed as a supplementary diagnostic. The results revealed that no single factor accounted for the majority of variance among the measurement items, indicating that common method variance does not pose a serious concern. Collectively, these diagnostic results confirm that the high explanatory power of the model reflects strong theoretical specification and meaningful empirical relationships rather than statistical overfitting or methodological artifacts. Table 1 provides these results.

Table 1: Factor Loading

Variables	Items	Factor loading	Cronbach's Alpha	rho-a	rho-c	AVE
Artificial Intelligence	AI1	0.847	0.888	0.889	0.918	0.692
	AI2	0.776				
	AI3	0.871				
	AI4	0.837				
	AI5	0.825				
Business Performance	BP1	0.834	0.839	0.841	0.892	0.674
	BP2	0.826				
	BP3	0.848				
	BP4	0.776				
Operational E-HRM	OE1	0.845	0.93	0.964	0.944	0.736
	OE2	0.851				
	OE3	0.804				
	OE4	0.911				
	OE5	0.879				
	OE6	0.845				
Quality of AIS	DAIS1	0.758	0.899	0.902	0.923	0.665
	DAIS2	0.863				
	DAIS3	0.825				
	DAIS4	0.844				
	DAIS5	0.817				
	DAIS6	0.783				
Relational E-HRM	RE1	0.748	0.867	0.872	0.904	0.653
	RE2	0.783				
	RE3	0.808				
	RE4	0.873				
	RE5	0.748				
Transformational E-HRM	TE1	0.75	0.856	0.855	0.897	0.636
	TE2	0.851				
	TE3	0.792				
	TE4	0.732				
	TE5	0.854				

According to Table 1, the measurement of artificial intelligence was done with five items, whereby factor loading ranged between 0.776 and 0.871, which is a high association between the indicators and the latent construct. The Cronbach's Alpha and rho a values were found to be beyond the 0.70 threshold, and this indicates high internal consistency. Equally, the composite reliability (rho c = 0.918) value was high, and the AVE value at 0.692 was good to show a good convergent validity that the construct is capturing a large percentage of its variance. There were four items of business performance with the factor loading of between 0.776 and 0.848. Although the Cronbach Alpha and rho a were not below the recommended standards, the internal consistency between the items was acceptable. The construct integrity was proved by the composite reliability value (0.892), and the AVE value of 0.674 supported the idea of sufficient convergent validity because it proved that over half of the variance is covered by the indicators. Operational E-HRM was operationalized on six items, the factor loadings of which varied from 0.804 to 0.911. These values show high degrees of association between the items and the construct, and this proves the high levels of indicator reliability. The Cronbach's Alpha and rho-a were significantly higher than the threshold, and it was ensured that the internal coherence is high. The composite reliability was good with the rho c value of 0.944 and the AVE of 0.736, indicating high convergent and construct validity, respectively, and implies that the construct measures a significant proportion of the variation in the items. Quality of accounting information systems (QAIS) had six items, and factor loadings were between 0.758 to 0.863. There is a good item construct fit in these values. The values of the Cronbach's Alpha and rhoa were greater than 0.70, which means that the internal consistency of the items is high. The composite reliability (0.923) established high reliability, and the AVE set at 0.665 proved sufficient convergent validity as indicators of QAIS have always explained a significant amount of construct variance. There were five items used to measure relational E-HRM, with factor loadings ranging between 0.748 and 0.873. The reliability measures (Cronbach's Alpha and rho a) were more than recommended values, which proved that there was a high level of internal cohesiveness between the

indicators. The composite reliability of 0.904 was a good indicator of reliability, and the AVE of 0.653 indicated that the items represented the construct satisfactorily. Such findings confirmed that there was convergent validity of relational E-HRM in the general model. Transformational E-HRM comprises five items, which have a factor loading of between 0.732 and 0.854. These values of factor loading showed that they were highly aligned with the construct in the background. There was a high value of Cronbach's Alpha and rho a, and the composite reliability of 0.897 indicated the reliability of the measurement scale. The convergent validity was also supported by the AVE of 0.636, which indicated that the construct was able to capture the variance that was being measured by items. In general, the measurement model was found to have excellent psychometric characteristics in all the constructs. Factor loadings indicated sufficient indicator reliability, and Cronbach's Alpha, rho a, and rho c indicated a great internal consistency and composite reliability. The values of all the AVE were greater than 0.50, which assured enough convergent validity. Together, these findings prove that the measurement model is dependable and valid, and it can be used to assess the structural models in further research, such as testing the mediation and moderation relationship hypotheses in the conceptual framework.

5.1. Demographic variables

Table 2: Demographic Profiles of the Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	228	58.9
	Female	159	41.1
Age	18–24	62	16.0
	25–34	130	33.6
	35–44	106	27.4
	45 and above	89	23.0
Education Level	High School	78	20.2
	Bachelor's Degree	124	32.0
	Master's Degree	105	27.1
	PhD	80	20.7
Work Experience	Less than 1 year	55	14.2
	1–5 years	154	39.8
	6–10 years	114	29.4
	More than 10 years	64	16.5
Business Sector	Retail Trading	112	29.0
	Wholesale Trading	88	22.7
	E-commerce Trading	74	19.1
	Financial Market Trading	63	16.3
	Service-based Trading	50	12.9

The main target of the study was the traders, supervisors, HR personnel in support of the trading activities, and administrative personnel in the implementation of electronic human resource management (E-HRM) systems in trading environments. Although the majority of the responses were collected among traders and employees of the trading sector, some of the sample population consisted of operational-level employees and support staff who use the digital HR tools as part of the daily trading activity. Their replies augment the data by providing an idea of the daily lives of the digital Hr application in the retail trading, wholesale distribution, e-commerce trading, and financial market trading. The demographic factors are needed as important measures of diversity, experiences, and capabilities of individuals involved in the study. Gender, age, education level, work experience, and trading sector are just a few examples of variables that indicate more general social, economic, and professional processes, which, in turn, affect the way E-HRM adoption and performance outcomes are perceived. The systematic nature and understanding of these variables give an overview of population characteristics, aid in the development of the hypothesis of the possible relationships between these variables, and give the study a more contextual basis. Demographic distribution knowledge can also help in determining patterns that are applicable in the digital adoption, skill preparedness, and system use among the workforce in the trading sector. Table 2 shows the demographic profiles of the respondents. Out of the 387 respondents who participated in the study, 364 were men, and 231 were women. Among these, 228 males (58.9) and 159 females (41.1) were found, as there is a higher prevalence of male involvement in occupations involving trading and the market, as a rule. The most significant share of the population was comprised of those who are between the ages of 25 to 34 years (33.6%), then the respondents aged 35-44 years (27.4%). This implies that the sample will be comprised of early and mid-career traders, who are more likely to be flexible to digital transformation and E-HRM tools. As far as education level was concerned, 32% had a bachelor's degree, and 27 percent had a master's degree. It shows that the sample is fairly well educated, which is very pertinent in the research on digital systems and data-driven trading practices. Experience of work was also not the same; 39.8% of the respondents had 1-5 years of experience, 29.4% had 6-10 years of experience, and this indicates that we have both an experienced workforce and a workforce that is just beginning. The identification of industries was adjusted to the trading industry that was considered in the research. The most represented were retail traders (29%), after wholesale, e-commerce, service traders, and financial market traders. This variety made sure that the results reflected various aspects of the trader's business performance under E-HRM systems. The demographic information that can be found in Table 2 is reflective of a balanced and contextually applicable sample that offers a credible analysis of digital HR practices in trader settings.

Table 3: Discriminant Validity (HTMT)

	Artificial Intelligence	Business Performance	Operational E-HRM	Quality of Accounting Information Systems	Relational E-HRM	Transformational E-HRM
Artificial Intelligence						
Business Performance	0.84					
Operational E-HRM	0.335	0.319				
Quality of Accounting Information Systems	0.674	0.708	0.345			
Relational E-HRM	0.7	0.716	0.389	0.541		
Transformational E-HRM	0.564	0.592	0.387	0.737	0.503	

Table 3 contains the values of the Heterotrait-Monotrait Ratio (HTMT) applied to measure the discriminant validity. An HTMT of less than 0.85 (strict measure) or 0.90 (a value embraced by most authors in studies of HRM and digital transformation) shows that constructs

are empirically distinct, and their overlap is not conceptual. Table 3 shows that all the HTMT values are within acceptable limits. The correlation between Artificial Intelligence and Business Performance (0.84) does not reach the threshold, which proves that the constructs are closely related but separate at the same time. The values of Operational E-HRM and the other constructs (0.335-0.389) are rather low, which is the indication of clear differentiation and high-level discriminant validity. Quality of Accounting Information Systems also demonstrates good levels of HTMT (0.345-0.737), which means that the construct is not theoretically dependent, has significant theoretical links to E-HRM dimensions, and business performance. Relational E-HRM shows moderate levels of HTMT (0.7000.716), which are comfortably below the mark, proving that relational digital HR practices are still empirically independent of other constructs. Transformational E-HRM also demonstrates satisfactory values (0.5030.737), which confirms that it is a valid strategic HR dimension that inherently is the one that tends to have stronger correlations with AI and performance-related variables. In general, the HTMT findings prove that Artificial Intelligence, Business Performance, Operational E-HRM, Relational E-HRM, Transformational E-HRM, and Quality of Accounting Information Systems are all constructs that are empirically different. This strengthens the validity of the measurement model and justifies its appropriateness in the further structural analysis, such as the analysis of the mediating and moderating relationships.

Table 3: Discriminant Validity (Fornell-Larcker Test)

	Artificial Intelligence	Business Performance	Operational E-HRM	Quality of Accounting Information Systems	Relational E-HRM	Transformational E-HRM
Artificial Intelligence	0.832					
Business Performance	0.956	0.821				
Operational E-HRM	0.325	0.298	0.858			
Quality of Accounting Information Systems	0.608	0.615	0.32	0.816		
Relational E-HRM	0.619	0.615	0.37	0.479	0.808	
Transformational E-HRM	0.494	0.5	0.344	0.648	0.431	0.798

Table 3 indicates the Fornell-Larcker discriminant validity findings. The criterion stipulates that the square root of the AVE of each construct (on the diagonal) should be larger than its correlation with other constructs. The findings indicate that this requirement has been met in all the variables, which supports the idea that each construct measures a distinct conceptual field in the research. Artificial Intelligence (0.832) is above its correlation with the other constructs, although its correlation with Business Performance is also relatively high. Business Performance also exhibits sufficient discriminant validity with the diagonal value (0.821) greater than the correlations of 0.298 to 0.615. Operational E-HRM has a diagonal of 0.858, which is much higher than all the inter-constructs, which proves its unique presence in the E-HRM model. Quality of Accounting Information Systems is a diagonal of 0.816, a higher value than in its correlations with other constructs, which supports the fact that quality of Accounting Information Systems is a distinct dimension that is system-related. The value of Relational E-HRM (0.808) also surpasses all the associated correlations, which proves that relational elements of digital HR practices are still empirically differentiable. Transformational E-HRM equally meets the criterion with a diagonal of 0.798, which proves its status of being a unique higher-order strategic construct. In general, the Fornell-Larcker test proves that the constructs show an appropriate discriminant validity. This contributes to the soundness of the measurement model, and the study can go further to structural model testing, which involves the testing of the mediation and moderation effects.

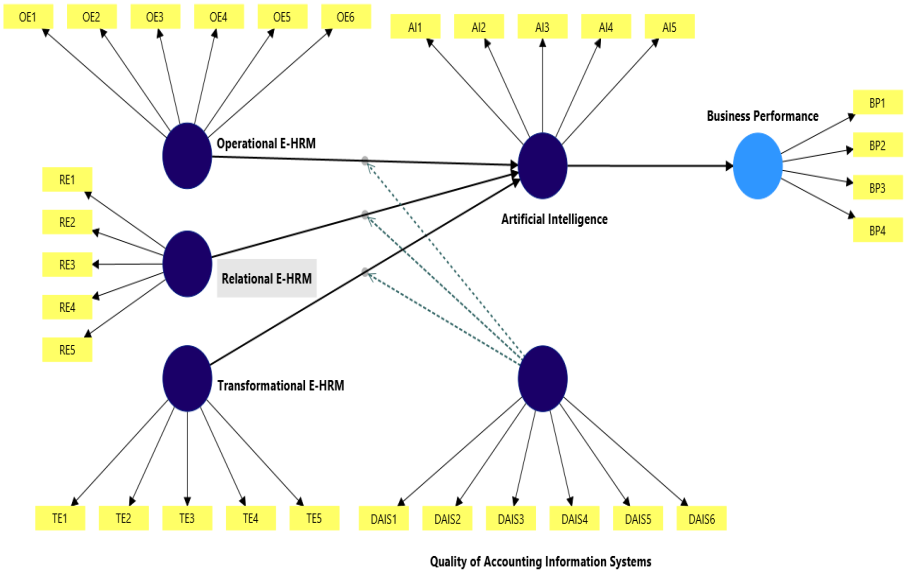
Table 4: R-Square Adjusted

Variable	R-square	R-square adjusted
Artificial Intelligence	0.59	0.581
Business Performance	0.913	0.913

The R-SQ and R-SQ adjusted of the two endogenous constructs are as in Table 4, which shows the power of the model to explain. The adjusted value of R-square is 0.581, indicating that AI adoption in a trading-based scenario can be described by the predictors of the model to 58.1 percent, which is a high degree of explanatory power of the model on behavioral and technological constructs. Business Performance shows an even greater value of R-Sq adjusted of 0.913, indicating that Operational E-HRM, Relational E-HRM, Transformational E-HRM, Artificial Intelligence, and a moderating factor of Accounting Information System quality explain more than 91 percent of its variance.

5.2. Structural model

After the reliability and validity of the measurement model were confirmed, the structural model was evaluated to ascertain the support that the proposed relationships between the study variables had. The analysis was aimed at analyzing the predictive validity of the model, the relevance of the theorized paths, and the degree to which E-HRM dimensions, Artificial Intelligence, and the quality of accounting information systems can explain the performance of the traditional business. The model was found to be highly predictive as the values of R-squared represented significant explanatory variance in both Artificial Intelligence and Business Performance. The structural analysis also gave an idea of how the working, relational, and transformational E-HRM all combine to influence performance results. The moderating role of the quality of Accounting Information Systems helped to understand how the accuracy of the information, the reliability of the system used, and the integrity of the reporting system reinforced or diluted the relationships. Moreover, the model also incorporates the concept of Artificial Intelligence as it underlines the rise of smart digital solutions to improve decision-making and performance in the trading settings. In general, the structural model provides detailed insight into the interaction of digital HR practices and quality of systems to determine the business performance of the trader, which forms the basis of further hypothesis testing and causal evolution interpretation. Under these psychometric conditions, the structural model was examined to identify the degree to which Operational, Relational, and Transformational E-HRM has a relationship with the performance of the trader business. Moreover, the moderating value of Quality of Accounting Information Systems and the effect of Artificial Intelligence were also considered to learn the impact of digital capabilities on transforming performance outcomes in trading settings. Figure 2 is the structural pathways, and displays the relationships that were tested in the model.



5.3. Hypothesis testing

This section is the part that provides the result of hypothesis testing based on the structural model, which tests the contribution of the dimensions of the Electronic Human Resource Management, Artificial Intelligence, and the Quality of Accounting Information Systems to the performance of the trader business. The conceptual framework and moderating relationships were tested with structural equation modeling (SEM) through SmartPLS. The t-statistics, p- p-values, standard deviation, and path coefficients in Table 5 were used to give an understanding of the strength and significance of the theoretical associations. The initial hypothesis was aimed at the direct effect of Operational E-HRM on business performance. The outcome (= 0.101, p = 0.033) proves that the effect is positive and significant, meaning that digital operational HR practices can play an important role in the performance results in trading settings. These measures make transactional operations easier, workforce operations smoother, and improve operational continuity, which causes performance improvements to be measured. The second hypothesis tested the influence of Quality of Accounting Information Systems on business performance. According to the findings (χ^2 = 0.269, p = 0.000), there is a strong and significant relationship between the reliability of accounting information, the accuracy of accounting information, and the high integrity of accounting information, and the trader performance in terms of performance enhancement, informed decision-making, and operational uncertainty reduction. The proposed framework distinguishes clearly between mediation and moderation mechanisms. Artificial Intelligence is conceptualized as a mediating mechanism that explains how Electronic Human Resource Management (E-HRM) practices translate into improved business performance. In contrast, the Quality of Accounting Information Systems (QAIS) is modeled as a moderating mechanism that explains when and under what conditions E-HRM practices exert stronger or weaker effects on performance outcomes. This distinction ensures conceptual clarity by separating the transmission process of digital value creation from the contextual conditions that shape its magnitude.

Table 5: Hypothesis Testing

	Original sample	Standard deviation	T statistics	P values
Operational E-HRM -> Business Performance	0.101	0.047	2.136	0.033
Quality of Accounting Information Systems -> Business Performance	0.269	0.053	5.066	0.000
Quality of Accounting Information Systems x Operational E-HRM -> Business Performance	-0.246	0.059	4.144	0.000
Quality of Accounting Information Systems x Relational E-HRM -> Business Performance	-0.065	0.061	1.070	0.285
Quality of Accounting Information Systems x Transformational E-HRM -> Business Performance	0.104	0.031	3.341	0.001
Relational E-HRM -> Business Performance	0.308	0.057	5.427	0.000
Transformational E-HRM -> Business Performance	0.016	0.042	0.385	0.701

The moderating hypotheses also involved the relationship between Accounting Information System quality and various E-HRM dimensions. Relationship between AIS quality and Operational E-HRM achieved a significant negative relationship (β = -0.246, p = 0.000), so that relations with stronger system quality yield less incremental benefit of operational HR digitalization- this could be because well-attained system quality already offers enough structure and control. On the other hand, the AIS quality/Transformational E-HRM interaction was significantly positive (= 0.104, = 0.001), meaning that a well-developed system quality elevates the strategic impact of the transformational HR practices in the performance, especially elevating the strategic fit and capability development over time. Nevertheless, the moderation between AIS quality and Relational E-HRM was weak (= -0.065, p = 0.285), which means that the quality of systems does not significantly change the effectiveness of such relational HR practices as communication, digital collaboration, and employee support systems. The immediate impacts of the relational and transformational aspects of E-HRM were also put to the test. The Relational E-HRM demonstrated a significant and strong influence on the business performance (0.308, p = 0.000), which means that the digital communication and other employee engagement mechanisms, as well as relationship-based HR tools, have a significant impact on the business performance. On the contrary, Transformational E-HRM showed no remarkable direct effect (= 0.016, = 0.701), meaning that long-term HR transformation programs might not have a direct positive effect on performance in the trading environment, without accompanying systems or contextual considerations. All of these findings combined help to understand the role that various dimensions of E-HRM play in business performance and the influence of conditions of system quality on such effects. They further indicate the digital HR practices that have a

quick operational impact and those that need strategic alignment to create value. The structural model thus gives detailed support to the theoretical premises of the study as well as explains how the digital HR and system capabilities affect the trader's business performance.

6. Discussion

The results of the current report provide good empirical evidence for the suggested framework that examines the impacts of various aspects of the Electronic Human Resource Management (E-HRM), Artificial Intelligence, and the Quality of Accounting Information System on the performance of traders' business in the digital trading context. The findings indicate that operational and relational practices of E-HRM have a significant impact on improving business performance, but transformational E-HRM did not have any direct effect. This is a practicality in the real world of trading industries, where day-to-day relationship communication and operational accuracy have more impact on performance results than long-term HR development programs. The fact that Operational E-HRM has a positive and significant impact proves that digitally facilitated HR functions, including automated payroll, scheduling, and employee tracking, have direct performance impacts and enhance the consistency of workflow, and minimize procedural inefficiencies. These results are consistent with the prior studies that focus on the idea that the digitalization of operational HR activities increases the accuracy of administration and responsiveness in operations. Equally, Relational E-HRM revealed that it significantly impacted performance, indicating the significance of digital communication tools, engagement strategies, and HR service platforms in facilitating the interaction, coordination, and responsiveness of employees, which are the key concerns in performance in high-paced trading conditions. The quality of the Accounting Information System (AIS) also became a key factor that determines the level of business performance. This impact is powerful and substantial, which contributes to the idea that quality and reliable financial information, proper reporting, and good-quality computer systems of accounting can contribute to the decision-making processes, decrease the risks of performance, and improve the overall organizational performance. This observation supports the strategic significance of the quality of AIS as a supporting capability that promotes the performance of information-intensive industries like trading. The moderation outcomes give more information about the situational factors that change the implications of the E-HRM practices. The high negative moderation between AIS quality and Operational E-HRM also indicates that the further value of enhancing operational HR digitalization becomes smaller, where the level of accounting systems is already high in accuracy and reliability. This implies that there could be a substitution effect, and this is that the structural reliability of the strong accounting systems will lower the marginal performance benefits of further operational E-HRM improvements. On the other hand, the effect of Transformational E-HRM was greatly enhanced by the AIS quality. It implies that strategic HR activities, including developmental planning, digital talent analytics, and capability building, can be more efficient with the quality information that is provided by the system. Under such circumstances, AIS quality serves as a complementary ability that increases the strategic effectiveness of transformational HR practices. But the moderating effect between AIS quality and Relational E HRM was not significant. This can show that relational HR practices, communication, digital support, and collaboration are independent of the quality of the system and are rather dependent on interpersonal or platform-specific forces as opposed to financial system accuracy or accounting. The result underscores the importance of differentiating between operational, relational, and strategic HR practices in considering digital to performance connections. Moreover, the negligible direct impact of Transformational E-HRM on business performance implies that strategic HR initiatives might need longer periods of time or other organizational prerequisites to produce the performance outcomes. The fast trading environments, short-cycle, high-pressure operation-based, might place a premium on short-term operational and relationship HR contributions over long-term transformation efforts. Future studies can examine whether transformational E-HRM has an indirect contribution with the help of mediators like innovation capability, learning culture, or strategic alignment. In general, the findings affirm that digital HRM practices and quality of AIS are primary digital capabilities that determine business performance in contemporary trading environments. The explanatory power of the model is high, which supports the importance of applying HR digitalization, intelligent systems, and information accuracy in the performance frameworks. These results add to the wider body of literature because they illustrate the functionality of various layers of digital HR practices in the diverse system-quality settings, which can assist managers aiming to derive the most out of digital investments by focusing on performance optimization. The mediation analysis demonstrates that Artificial Intelligence serves as a critical transmission mechanism through which E-HRM dimensions influence trader business performance. While E-HRM practices provide digital structure and process efficiency, Artificial Intelligence converts these inputs into predictive insights, automated decision support, and analytical intelligence. This explains why AI operates as a mediator rather than a direct antecedent, reinforcing the role of intelligent systems in translating digital HR practices into measurable performance outcomes in fast-paced trading environments.

The negative moderating effect of accounting information system quality on the relationship between operational E-HRM and business performance can be theoretically explained through substitution and diminishing-returns logic. Operational E-HRM focuses on automating routine HR activities such as payroll processing, attendance tracking, and administrative reporting. When the quality of accounting information systems is already high, many of these control, accuracy, and compliance functions are effectively ensured at the system level. As a result, the marginal performance contribution of additional operational HR digitalization decreases, producing a negative moderation effect. From a dynamic capabilities perspective, this finding suggests that overlapping digital capabilities may substitute rather than complement each other when they address similar operational efficiencies. High-quality accounting systems already provide standardized data processing, reliability, and procedural control, reducing the incremental value created by further operational E-HRM investments. Consequently, operational E-HRM yields stronger performance benefits in environments where accounting system quality is moderate or developing, while its impact diminishes as system quality reaches advanced levels.

6.1. Theoretical implications

This research is specific to the theoretical basis of digital human resource management as it shows how the three dimensions of E-HRM operational, relational, and transformational bring about different contributions to the performance of the trader business. Based on the current theory on digital management, the results indicate that operation and relational E-HRM are instantaneous performance-related capacities, whereas transformational E-HRM is a strategic capacity in the long term, and may not always result in immediate performance benefits in the context of highly dynamic trading. The high impact of the quality of accounting information system parties bolsters the considered perspective that digital performance results rest upon the integrity, accuracy, and reliability of information structures that are supportive of HR and business processes. One of the most important theoretical contributions is to explain in what circumstances the interaction of digital and HR-related capabilities takes place. The observed negative moderation between the quality of AIS and the operational E-HRM indicates the existence of the substitution effect in that an increase in the accuracy of the system decreases the marginal benefit of further operational digitalization. On the other hand, there is the positive moderation that entails transformational E-HRM, which

implies a complementary relationship where high quality of the system enhances the strategic value of long-term HR efforts. These results build on the current body of research because they demonstrate that digital capabilities do not positively affect performance across the board, but instead influence are contingent on the nature of the HR practice and quality of supporting information systems. The great role of AI in influencing the results of performance also proves that the theoretical place of AI is cross-functional digital asset enhancements, making decisions, responsiveness, and analytical depth stronger in trading environments. By jointly modeling Artificial Intelligence as a mediator and QAIS as a moderator, the study demonstrates that digital HR value creation depends both on internal transformation mechanisms and on contextual system-quality conditions.

6.2. Practical implications

The findings provide practical advice to managers, HR leaders, and digital transformation practitioners in the trading organizations. To begin with, organizations ought to pursue the enhancement of operational and relational E-HRM practices, since the dimensions prove to have the most proximate and substantial involvement in business performance. Responsiveness and efficiency in the trading activities can be directly increased by improving digital workflows, simplifying administrative processes, and improving communication and coordination systems. Second, the strong influence of AIS quality implies that companies should focus on investing in high-quality digital accounting packages. Daily decision-making is only possible through the assistance of reliable financial and operational data, but it is also the stabilizing background that promotes the performance of the strategic HR initiatives. The leaders need to make sure that accounting platforms are frequently updated, and have been well-integrated into HR systems, and can provide real-time and transparent information. Third, the positive moderation between the quality of AIS and transformational E-HRM means that strategies of long-term HR development, which include digital learning, strategic workforce planning, and capability-building programs, are more effective in the case of strong information systems. Strategic HR programs should thus be combined with data-driven accounting and analytics tools in organizations to enhance alignment of employee development with organizational objectives. Fourth, the HR and accounting systems should incorporate AI abilities to reinforce decision-making. Predictive analytics, automated performance feedback, and AI-based training recommendations can also add value to the E-HRM as well as AIS quality by providing more insight, minimizing delays, and increasing accuracy. Collectively, these results confirm that investment in technology is not sufficient. The performance benefits are observed when the HR systems, accounting systems, and intelligent tools are integrated in a digital context of an equal mix between the operational execution and strategic development.

6.3. Limitations and future research directions

Even though this research can deliver significant findings on the connection between E-HRM, AIS quality, Artificial Intelligence, and trader business performance, certain limitations are to be mentioned. To begin with, the cross-sectional research design does not facilitate the researcher to measure long-term developmental impacts, especially on transformational E-HRM practices, which might need long-term horizons in influencing performance. The future research must assume longitudinal designs to monitor the development of performance results as digital HR systems get older. Second, there is the risk of perceptual bias when self-reported data is used, especially when estimating the effectiveness of a system or employee experience. Further studies ought to combine various data sources, such as objective performance measures, financial measures, and supervisor ratings, to increase validity and decrease the common method variance. Third, this research was carried out in the framework of the trader business settings, in which the level of operational intensity and the speed of decision-making are high. This, consequently may not apply to slower-paced or more hierarchical industries. The comparative analyses in the industries like manufacturing, banking, or logistics may help to determine whether there are variations in the relative significance of E-HRM dimensions across the business models. Fourth, the moderating findings show that the AIS quality has different interactions with the HR practices based on their strategic level. In the future, it should be researched whether other moderators, including organizational culture, digital readiness, leadership support, data governance, or employee technological competence, exist. These considerations might provide more profound reasons as to why certain E-HRM dimensions are more competently converted into performance results. Lastly, although the model can describe a large percentage of variation in the performance of business, some percentage lacks explanation. Other types of digital constructs, including cybersecurity preparedness, digital talent analytics, or quality of platform integration, may be applied to future work. These variables can be included to improve the knowledge of the impact of digital ecosystems on performance, especially where performance speed and information accuracy are of crucial importance.

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