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The influence of human resource information systems on employee performance within the Ministry of Communications and Transportation in the Kingdom of Bahrain

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Background: Employee performance (EP) is a key factor in organizational success. Nonetheless, the impact of particular factors on EP remains variable across research. This study investigated the influence of Communication and Collaboration (CC), Employee Efficiency (EE), Level of HRIS Training (LHT), and Performance Analysis (PA) on Employee Performance (EP) within the Ministry of Communications and Transport (MCCT) in Bahrain.

Methods: A quantitative, descriptive-correlational methodology was employed. Data were obtained from 243 convenience-sampled participants, with 167 valid responses subjected to analysis. Reliability was established through Cronbach's alpha ($\alpha = 0.827$). Descriptive statistics were conducted using SPSS v28, and Partial Least Squares Structural Equation Modeling (PLS-SEM) was executed with SmartPLS 4. The model's validity was assessed through reliability indices, AVE, VIF, and goodness-of-fit indices.

Results: The analysis indicated that CC ($\beta = 0.268$, $p = 0.002$), EE ($\beta = 0.280$, $p = 0.012$), and LHT ($\beta = 0.261$, $p = 0.006$) exerted significant positive influences on EP. Conversely, PA ($\beta = 0.067$, $p = 0.272$) exhibited no statistical significance. Effect size analysis (f^2) revealed minimal contributions (0.029–0.094), although CC and EE revealed a comparatively greater impact. The model accounted for $R^2 = 0.335$ (33.5%) of the variance in EP, indicating moderate explanatory efficacy. The fit indices satisfied the prescribed thresholds (e.g., CFI = 0.982, TLI = 0.977, RMSEA = 0.072).

Conclusion: The study concludes that CC, EE, and LHT are substantial determinants of PE, whereas AP shown no direct effect. The findings underscore the significance of communication, efficiency, and training in enhancing employee outcomes, while also indicating the need for further research on the contextual role of performance analysis.

KEYWORDS

employee performance, communication and collaboration, employee efficiency, level of training, performance analysis, statistically significant, Ministry of Communications and Transportation, Bahrain

1 Introduction

The swift development of the digital transformation period has facilitated significant technological improvement, that is aimed at enhancing and streamlining operational processes across diverse industries (Ersoy et al., 2022). An important advancement in the field of Human Resources (HR) is the introduction and subsequent integration of Human Resource Information Systems (HRIS) (Bhakuni and Totlani, 2023). This novel system is designed to enhance the administration, decision-making processes, and general efficacy of HR departments by proficiently gathering, storing, arranging, and examining data relevant to an organization's workforce (Islam and Tamzid, 2023).

The use of HRIS has been widely recognized and accepted by many sectors worldwide, leading to a significant shift in the management of HR and operational effectiveness (Qamari and Rakotoarizaka, 2022). However, despite being widely recognized and used, there is still a notable study deficiency about the concrete effects of HRIS on employee performance (Kaushal et al., 2023). The Ministry of Communications and Transportation in the Kingdom of Bahrain serves as an outstanding instance of a significant sector that has not only acknowledged the promise of these technologies but has also effectively incorporated them into its operational framework.

According to Sikandar et al. (2022), the advancement of digital improvement encompasses more than just technical advancements. Furthermore, this highlights the Kingdom's commitment to developing a workforce that has advanced digital skills and is not just proficient but also highly motivated, engaged, and in alignment with the nation's overarching goals (Alhajeri, 2022). By examining the potential relationship between the implementation of HRIS and improvements in EP, stakeholders may make well-informed choices on future investments in these technologies. This will assist in ensuring that the Kingdom maintains its position as a leader in digital advancement within the region.

The objective of this study is to thoroughly examine the challenges surrounding the implementation of a HRIS and its potential impact on enhancing EP, particularly within the context of the Ministry. Considering the Kingdom of Bahrain's ambitious goal of strengthening its digital infrastructure and enhancing the quality-of-service provision, it is crucial to comprehend the relationship between the adoption of HRIS and the subsequent performance of its workforce.

In conclusion, it can be inferred that the use of HRIS will undoubtedly have a significant impact on the digital landscape of the Kingdom of Bahrain as it progresses forward. Hence, this study functions as a conduit, establishing a connection between technological ambitions and concrete workforce results.

1.1 Research objectives (RO)

1. To examine the effect of Communication and Collaboration (CC) on Employee Performance (EP) at Bahrain's Ministry of Communications and Transportation.
2. To investigate the impact of Employee Efficiency (EE) on Employee Performance (EP) at the Ministry of Communications and Transportation in Bahrain.
3. To analyze the role of Level of HRIS Training (LHT) in influencing Employee Performance (EP) at the Ministry of Communications and Transportation in Bahrain.
4. To assess the effect of Performance Analysis (PA) on Employee Performance (EP) at the Ministry of Communications and Transportation in the Kingdom of Bahrain.

2 Literature review

In the era of digital transformation, the HRIS have become a crucial element in the transformation of conventional human resource management practices. This has led to increased efficiency and the adoption of a decision-making culture that is based on data. When examined through the lens of the Ministry of Communications and Transportation in the Kingdom of Bahrain, the ramifications of HRIS have become apparent in several aspects.

The enhancement of employee performance is contingent upon many crucial aspects, including staff efficiency, training, and performance analysis (Diawati et al., 2023; Saputra et al., 2024). The enhancement of efficiency not only serves to increase individual production, additionally contributes to the cultivation of a favorable work environment. Training provides individuals with the necessary skills and information to effectively perform their duties and achieve exceptional performance in their respective positions (Bandura, 2023). Performance analysis is a crucial tool that offers significant insights, enabling staff to effectively address areas of weakness and use their strengths. These components jointly lead to enhanced employee performance and corporate achievement.

The advent of HRIS have undeniably transformed the international HR domain. According to Abuhantash (2023), the contemporary HR process benefits greatly from the systematic and streamlined approach offered by HRIS. This enhanced agility is seen across several HR functions, including recruiting, payroll, and training. The remark made by Magege and Ngirwa (2023), reaffirms the notion that the integration of HRIS has led to a noticeable improvement in administrative efficiency inside Bahrain's governmental institutions, particularly its ministries. Efficient optimization is of utmost importance in sectors such as the Ministry of Communications and Transportation, where the timely and accurate implementation of tasks is crucial for achieving operational excellence (Mohsan et al., 2023). Moreover, Hoai et al. (2022) emphasize the system's capacity to enhance the efficiency of data retrieval, hence facilitating timely job completion and mitigating bureaucratic stagnation.

Nevertheless, the discourse around HRIS is not exclusively characterized by positive aspects. Although the system has gained international recognition for its benefits, such as less paperwork, improved real-time PA, and proactive predictive analytics, it also presents certain challenges (Jain et al., 2023; Diraco et al., 2023). The aforementioned factors include a variety of concerns, including a tangible aversion to change, the possibility of data breaches, and the possible

drawbacks associated with excessive dependence on automation (Devaki and Leena Jenifer, 2022). In the case of Bahrain, the dynamics provide an additional level of intricacy. Feng (2023) discusses the nuanced relationship between entrenched hierarchical decision-making and the democratizing, and often disruptive, effect of HRIS.

One may argue that the substantial influence of HRIS can be observed in its ability to reconfigure the interconnected aspects of communication, cooperation, and decision-making within organizational settings. The use of a centralized repository, as suggested by Tejedo-Romero et al. (2022) facilitates enhanced transparency, consistency, and efficiency in communication. McLean (2023) further elaborates on this narrative by proposing that HRIS has the potential to remove information silos, hence creating an environment conducive to the development of cross-departmental synergy. Decision-makers are now equipped with a wealth of real-time data analytics, enabling them to make timely, relevant, and well-informed judgments (Testa and Karpova, 2022; Ling and Verma, 2023; Abdalla et al., 2023).

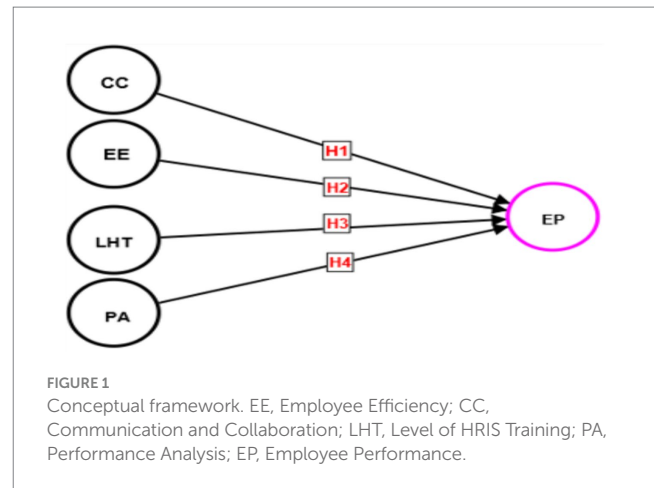
The significant implications for EP arise from the intersection of these changes with the degree of HRIS training and performance analysis, resulting in ripple effects (Gwiza et al., 2022). Mideksa (2023) highlights the significant importance of training in HRIS, highlighting that the effective usage of HRIS can only be achieved when personnel possess proficient training. This element has a strong positive correlation with the improvement of communication and collaboration capabilities offered by HRIS (Bhakuni and Totlani, 2023; Koech et al., 2022; Koech, 2022). In addition, the potential of HRIS to provide detailed and specific analysis of performance, at both the individual and departmental levels, represents a significant shift in the way performance metrics and evaluation systems are evaluated and adjusted (McCartney and Fu, 2024; Štaffenová and Kucharčíková, 2023; Madid, 2023).

In conclusion, the Ministry of Communications and Transportation in the Kingdom of Bahrain finds itself at a critical turning point. The incorporation of HRIS represents a significant change in operations, culture, and performance, rather than being a simple technological improvement. The appeal of efficient operations and improved performance indicators is unquestionably enticing. Nevertheless, it is important to navigate this course while being aware of the obstacles, particularly those that are specific to Bahrain's socio-cultural context. The success of Bahrain's digital journey will depend on effectively managing the opportunities and difficulties presented by HRIS, to achieve continuous development and a steadfast dedication to achieving high standards. Consequently, this has resulted in the formulation of the following hypothesis (Figure 1).

2.1 Hypotheses

H1: Communication and Collaboration (CC) has a significant positive effect on Employee Performance (EP) on the Ministry of Communications and Transportation in the Kingdom of Bahrain.

H2: Employee Efficiency (EE) has a significant positive effect on Employee Performance (EP) on the Ministry of Communications and Transportation in the Kingdom of Bahrain.



H3: Level of HRIS Training (LHT) has a significant positive effect on Employee Performance (EP) on the Ministry of Communications and Transportation in the Kingdom of Bahrain.

H4: Performance Analysis (PA) has a significant positive effect on Employee Performance (EP) on the Ministry of Communications and Transportation in the Kingdom of Bahrain.

3 Methodology

This research examined the influence of HRIS on Employee Performance (EP) within Bahrain's Ministry of Communications and Transportation employing a quantitative, descriptive correlational methodology. Data had been collected from 243 employees via structured online questionnaires. Reliability testing showed a Cronbach's alpha of 0.827, confirming internal consistency. The data analysis occurred in two phases: SPSS version 28 facilitated descriptive statistics and preliminary evaluations, while SmartPLS 4 used PLS-SEM to examine the measurement and structural models. Diagnostics included reliability, validity, collinearity (VIF), and predictive relevance (R^2), used bootstrapping (5,000 resamples) to evaluate hypotheses. Ethical norms were upheld, guaranteeing the anonymity and confidentiality of all participants.

4 Results

4.1 Background characteristics of the respondents

The research examined a sample of 167 participants, with a predominant representation of males (70%). With regard to the distribution of age, around 49% of the participants were between the 31–40 year age range, while 12.5% were below the age of 20. A substantial majority of individuals, namely 86.5%, have less than 10 years of professional experience. It is worth noting that a significant majority of the participants had a bachelor's degree, accounting for 65.8% of the total responses. The proportion of

TABLE 1 Profiles of the respondents.

Respondents characteristics	Category	N	(%)
Gender	Male	117	70
	Female	50	30
Age	Less than 20	21	12.5
	31–40	82	49
	41–50	31	18.5
	above 50	33	19.6
Experience	<10	145	86.5
	>10	22	13.1
Education	High school	12	7.1
	Diploma	7	4.1
	Bachelor	110	65.8
	Others	38	22.7
Total		167	

TABLE 2 $\mu \pm$ SD and rank for the variables.

Constructs	Number of items	Code	Mean $\pm$ SD	Rank
Employee efficiency	EE	6	2.940 $\pm$ 1.104	3
Communication and collaboration	CC	5	2.969 $\pm$ 0.970	1
Level of HRIS training	LHT	4	2.805 $\pm$ 1.085	4
Performance analysis	PA	6	2.986 $\pm$ 0.993	2
Employee performance	EP	8	2.884 $\pm$ 1.045	5
Total		29	2.908 $\pm$ 1.023	

EE, Employee Efficiency, CC, Communication and Collaboration, LHT, Level of HRIS Training, PA, Performance Analysis, EP, Employee Performance.

those with high school or diploma qualifications was comparatively lower, with 7.1 and 4.1%, respectively. The group labeled as “Others” within the context of schooling constituted 22.7% of the total sample (Table 1).

4.2 $M \pm$ SD and rank for the variables

The provided data illustrates an ordered set of five constructs, determined by their respective average scores. CC is ranked highest, with a mean score of 2.969 ± 0.970 , indicating that it is considered the most successful among the other groupings. PA closely trails behind with a mean value of 2.986 ± 0.993 . It is worth noting that each of these constructs has a standard deviation that is less than 1, suggesting a pretty high level of consistency in the assessments. The variables of EE and LHT exhibit a moderate level of ranking. However, their standard deviations exceed 1, suggesting a greater variability in the

TABLE 3 Multicollinearity test.

Path	VIF
CC $\rightarrow$ EP	1.401
EE $\rightarrow$ EP	1.460
LHT $\rightarrow$ EP	1.202
PA $\rightarrow$ EP	1.260

EE, Employee Efficiency, CC, Communication and Collaboration, LHT, Level of HRIS Training, PA, Performance Analysis, EP, Employee Performance.

scores. The EP metric, although having the highest number of elements, is ranked last with a mean score of 2.884 ± 1.045 . The mean value for all constructions is 2.908 with a standard deviation of 1.023. The data presented indicates that the domain of CC has the highest level of proficiency. However, there is still potential for improvement across all structures (Table 2).

4.3 Multicollinearity test

The Variance Inflation Factor (VIF) quantifies the extent to which the variance of an estimated regression coefficient is augmented due to the presence of correlation among the predictors (Venkatesh et al., 2023; Abulibdeh, 2022). According to accepted knowledge, a general guideline is that a VIF above a range of 5–10 indicates the presence of significant multicollinearity (Waqar et al., 2023; Wen and Wang, 2022). The VIF values for all variables (CC $\rightarrow$ EP: 1.401, EE $\rightarrow$ EP: 1.460, LHT $\rightarrow$ EP: 1.202, PA $\rightarrow$ EP: 1.260) are below the established threshold, suggesting the absence of substantial multicollinearity among the predictors in the model. This suggests that the predictors may be regarded as providing unique, non-overlapping information to the model, consequently validating their incorporation (Table 3).

4.4 Correlations

The demonstrated table presents a correlation matrix illustrating the relationships among five variables, namely CC, EE, EP, LHT, and PA. A value that is in proximity to 1 indicates a higher degree of correlations (Statistics Solutions, 2016). The correlation coefficients between CC and EE, as well as CC and EP, are modest, with values of 0.469 and 0.468, respectively. There exists a significant association ($r = 0.505$) between the variables EE and EP. The variable LHT has the greatest correlation coefficient of 0.385 with the variable EP, indicating a significant link. Conversely, the variable PA demonstrates the strongest association with the variable EE, with a correlation coefficient of 0.416. In general, the data indicates that there are different levels of dependency among the variables, with EE and EP revealing the strongest correlation (Table 4).

4.5 Goodness-of-fit of the model

The model has an acceptable degree of goodness-of-fit when evaluated using different indices. The p -value is congruent with the predetermined significance level (0.000), suggesting that the model adequately aligns with the observed data (Ren et al., 2023; Abraham

TABLE 4 Correlations test.

Construct	CC	EE	EP	LHT	PA
CC	1.000	0.469	0.468	0.362	0.251
EE	0.469	1.000	0.505	0.239	0.416
EP	0.468	0.505	1.000	0.385	0.381
LHT	0.362	0.239	0.385	1.000	0.276
PA	0.251	0.416	0.381	0.276	1.000

Notice, Employee Efficiency, CC, Communication and Collaboration, LHT, Level of HRIS Training, PA, Performance Analysis, EP, Employee Performance.

TABLE 5 Recommendation values of measurement variable.

Goodness-of-fit	Estimated model	Acceptable value
P value	0.000	$p < 0.001$
RMSEA	0.072	Less than 0.08
GFI	0.987	More than 0.90
AGFI	0.943	More than 0.90
NFI	0.939	More than 0.90
TLI	0.977	More than 0.90
CFI	0.982	More than 0.90

et al., 2023). The root mean square error of approximation (RMSEA) value of 0.072 falls below the commonly acknowledged criterion of 0.08, indicating a strong fit (Kudubeş et al., 2023). In addition, it is worth noting that the GFI, AGFI, NFI, TLI, and CFI values all above the threshold of 0.90, which suggests a strong correspondence between the proposed model and the empirical data (Sahoo, 2019; Bhakuni et al., 2021), it can be argued that the model has a high degree of reliability and validity in accurately capturing the fundamental data structure (Table 5).

4.6 Construct reliability and validity

The data provided indicates that all constructs present a high level of reliability, shown by Cronbach's alpha (α) and CR values beyond the suggested threshold of 0.7 (Mansour et al., 2023). This implies that all of the elements within each construct reveal a high degree of consistency in assessing their intended theoretical constructs (Clark and Watson, 1995). Nevertheless, while examining construct validity, it is seen that only the constructs CC and EE above the recommended level of 0.5 as Bedford and Speklé (2018) recommendations, indicating possible concerns about the validity of EP, LHT, and PA. Therefore, while the constructs exhibit reliability, more examination may be necessary to show strong validity for particular constructs (Figure 2; Table 6).

4.7 Discriminant validity

The discriminant validity of the constructs is supported by the structure of the matrix, shown by the higher values of the square root of the average variance extracted (AVE) on the diagonal (e.g., CC = 0.702, EE = 0.695) compared to the correlations between constructs

(off-diagonal values). As an illustration, the correlation coefficient (CC) of 0.702 is higher than its maximum correlation with other constructions, which is 0.494 with EE. This finding provides evidence that the conceptions under consideration are separate and distinguishable from one another (Kurbi et al., 2023; Alshuhumi et al., 2025) (Table 7).

4.8 Coefficient of determination result R^2

The coefficient of determination (R-square) for employee performance is 0.335, suggesting that about 33.5% of the variability in employee performance can be accounted for by the independent variables included in the model. This indicates that while a certain amount of performance variability is accounted for, a substantial 66.5% remains unaccounted for by the existing predictors. Hence, it is plausible that other variables have an influence on performance that have not been accounted for in the present model (Chen et al., 2019) (Figure 3; Table 8).

4.9 Effect size f^2

In the examination of f-square values, EE $\rightarrow$ EP has the largest impact size at 0.094, suggesting that it has a larger partial contribution than other variables. CC $\rightarrow$ EP and LHT $\rightarrow$ EP come in second and third, with 0.058 and 0.050, respectively, while PA $\rightarrow$ EP had the smallest impact at 0.029. The findings indicate that the predictors have varied degrees of importance, with EE clearly dominating (Amici et al., 2020). These magnitudes should be considered while making model refinement decisions (Figure 4; Table 9).

4.10 The assessment of the inner model and hypotheses testing procedures

The findings of the hypothesis testing demonstrate differing degrees of endorsement for the suggested relationships. The study examined four hypotheses to investigate the influence of several variables (CC, EE, LHT, and PA) on EP.

4.10.1 Analysis of hypothesis testing results

Hypothesis 1 (CC $\rightarrow$ EP): The hypothesis posits that there exists a positive relationship between CC and EP. The estimated t -value, given a β value of 0.268, a mean (μ) of 0.273, and a standard deviation of 0.086, is 3.106. The observed significance level of this finding is 0.002, which falls below the standard alpha threshold of 0.05. Consequently, substantial evidence exists to support this hypothesis.

Hypothesis 2 (EE $\rightarrow$ EP): The hypothesis suggesting an advantageous impact of EE on EP is also confirmed. The value of β is 0.280, the value of μ is 0.284, and the standard deviation is 0.111. The obtained t -value of 2.532, accompanied by a p -value of 0.012, demonstrates statistical significance. However, it is important to note that this significance is somewhat lower compared to the first hypothesis, however, it remains far below the conventional threshold of 0.05.

The impact of H3 (LHT $\rightarrow$ EP) is also observable, as shown by the β coefficient of 0.261, the mean (μ) of 0.253, and the standard

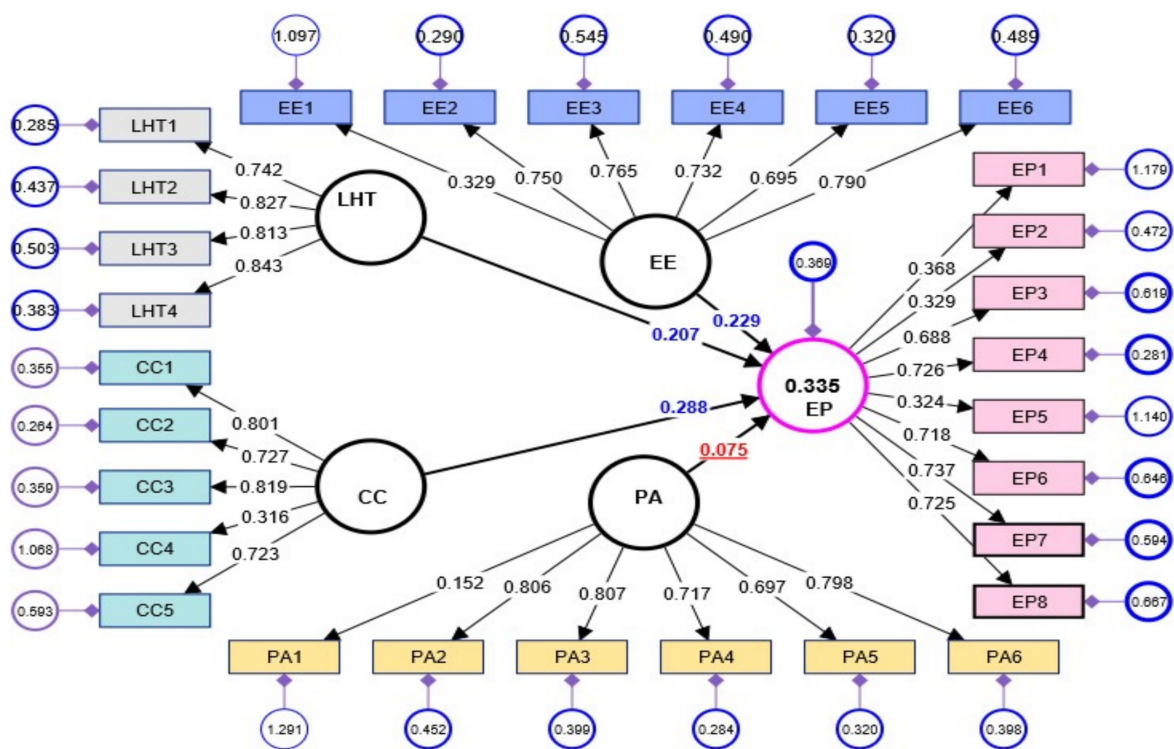


FIGURE 2 Assessment of measurement model. EE, Employee Efficiency; CC, Communication and Collaboration; LHT, Level of HRIS Training; PA, Performance Analysis; EP, Employee Performance.

TABLE 6 Construct reliability and validity.

Construct	α	CR	(AVE)
CC	0.801	0.809	0.630
EE	0.829	0.836	0.601
EP	0.810	0.809	0.551
LHT	0.881	0.885	0.578
PA	0.816	0.828	0.4193

Cronbach's alpha: average measure of internal consistency and item reliability and preferred when EFA is used for factor extraction. <0.7 accepted. CR: measure scale reliability overall and preferred with CFA. AVE: measures the level of variance captured by a construct 0.5 accepted. AVE, Average Variance Extracted. CR, Composite Reliability.

TABLE 7 Discriminant validity.

Construct	CC	EE	EP	LHT	PA
CC	0.702				
EE	0.494	0.695			
EP	0.493	0.430	0.606		
LHT	0.407	0.211	0.386	0.807	
PA	0.099	0.195	0.185	0.174	0.703

EE, Employee Efficiency; CC, Communication and Collaboration; LHT, Level of HRIS Training; PA, Performance Analysis; EP, Employee Performance. The square root of the average variance extracted is represented by diagonal, while the other elements reflect the correlation estimate.

deviation of 0.094. The obtained t -value in this analysis is 2.778, which, when combined with a p -value of 0.006, offers compelling support for the hypothesized relationship.

Hypothesis 4 (PA→EP): In contrast, the quantity of evidence for a relationship between PA and EP is not equivalent. The t -value of 1.100 is obtained from the given parameters: a beta (β) of 0.067, a mean (μ) of 0.064, and a standard deviation of 0.061. The p -value associated with this association is 0.272, which is above the significance level of 0.05. This finding suggests that there is no statistically significant relationship between (PA → EP). Hence, drawing on the existing evidence, it is not possible to assert with certainty that (PA) has a significant impact on (EP).

In a comparative analysis, it is evident that the first three hypotheses (namely, the effect of CC, EE, and LHT on EP) have

been substantiated by compelling statistical evidence. However, the fourth hypothesis, which proposes the influence of PA on EP, lacks empirical support. It is essential to comprehend that the absence of evidence does not automatically invalidate the association between PA and EP; rather, it indicates that, within the confines of this particular dataset and the circumstances examined, the relationship is not prominent.

In conclusion, the aforementioned results emphasize the significance of CC, EE, and LHT in the context of EP, accordingly, emphasizing the need for a more comprehensive investigation into the function of PA. Decision-makers and researchers need to take into account these findings when formulating strategies or interventions, with a particular emphasis on factors that have the most significant influence (Figure 5; Table 10).

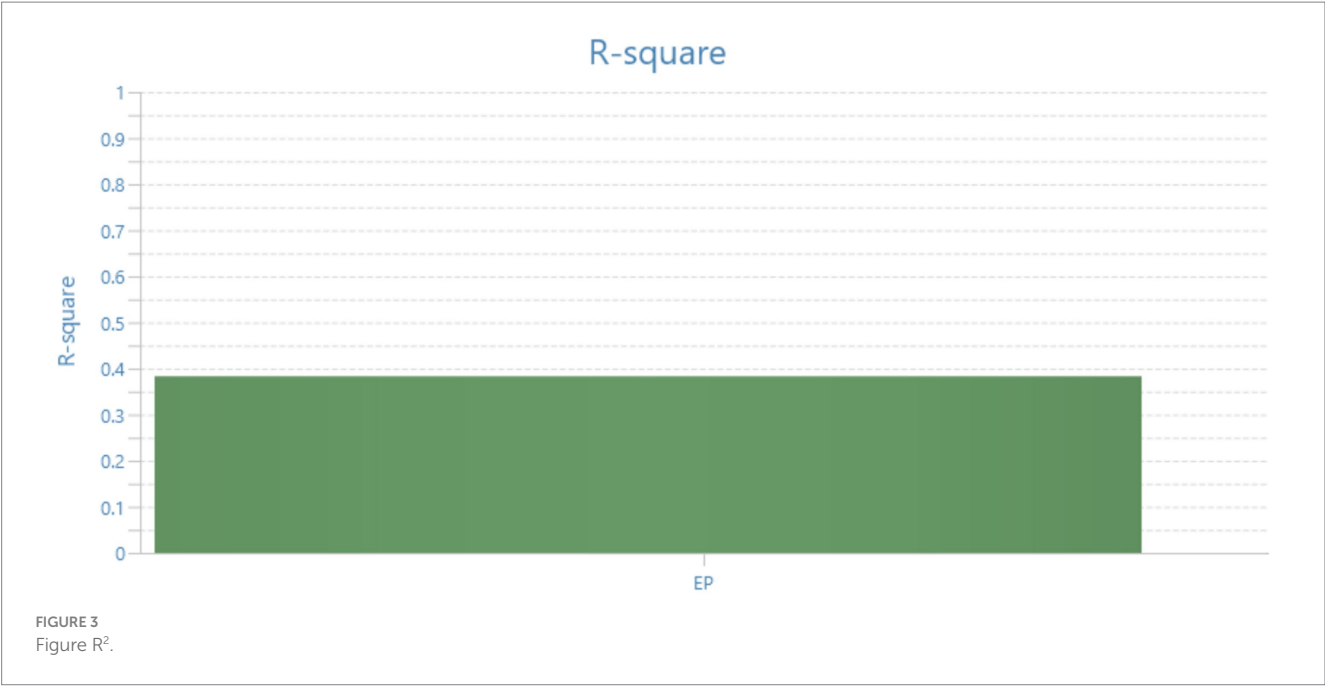
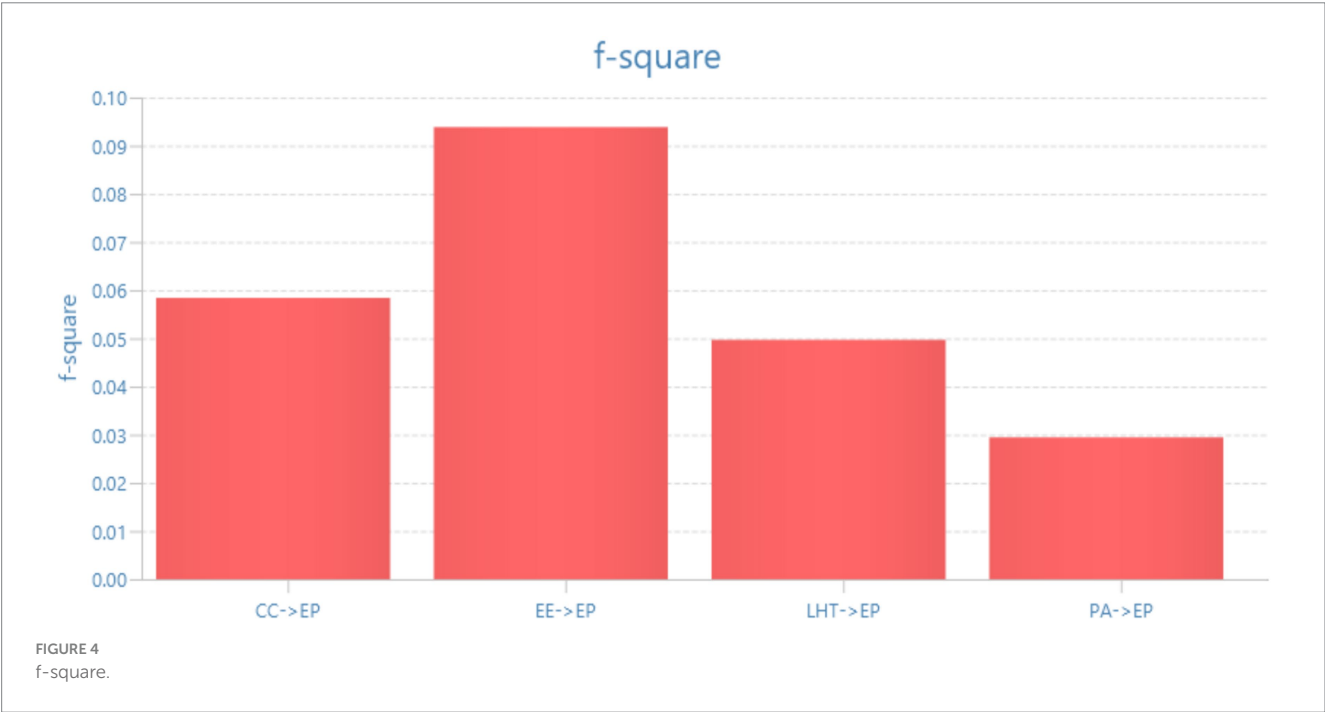


TABLE 8 R-square.

Endogenous construct	R ²	Hair et al. (2017)	Cohen (1988)	Chin (1998)
Employee performance (EP)	0.33.5	Acceptable	Average	Acceptable

R² = 0.335, it falls into the 0.25–0.49 range, which means it is considered weak to moderate.



5 Discussion

The previously mentioned findings provide compelling insights into the relationships between different variables and EP, shedding light on their relative efficacy and significance. It is essential to

comprehend the significant difference between the statistical data substantiating the first three hypotheses and the fourth hypothesis.

The present study provides empirical evidence supporting a beneficial relationship between CC and EP as shown by a *t*-value of 3.106 and a *p*-value of 0.002. These results align with the previous

research conducted by Chowdhury et al. (2022), which also revealed an advantageous relationship between CC and EP. With a beta coefficient of 0.268, it can be inferred that an increase of one value in the variable CC is associated with a corresponding rise of 0.268 values in the variable EP, while holding all other variables constant. This observation suggests that organizations that emphasize CC may have equivalent enhancements in EP. The statistical significance of this relationship is significantly above the stringent alpha level of 0.05.

TABLE 9 f-square.

Path	f-square
CC → EP	0.058
EE → EP	0.094
LHT → EP	0.050
PA → EP	0.029

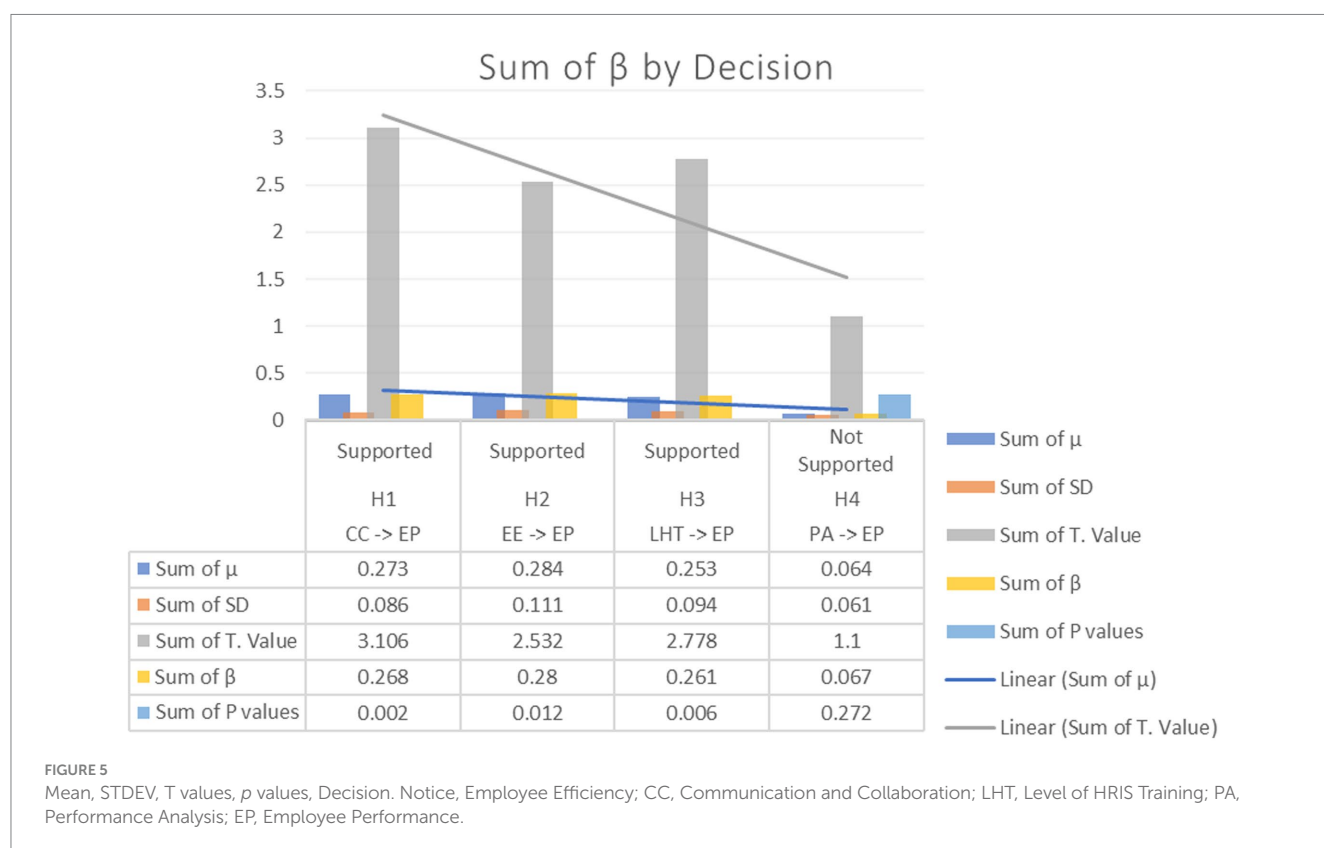
$F^2 = (R^2 \text{ included} - R^2 \text{ excluded}) / (1 - R^2 \text{ included})$. * F^2 0.02 weak, 0.15 moderate, 0.35 strong effects.

EE, Employee Efficiency; CC, Communication and Collaboration; LHT, Level of HRIS Training; PA, Performance Analysis; EP, Employee Performance.

*Higher value is preferred: 0.67 substantial, 0.33 average, 0.19 weak (Abdulsamad et al., 2025).

Similarly, the findings of this study indicate a significant relationship between EE and EP as shown by a t -value of 2.532 and a p -value of 0.012. These results are consistent with the conclusions reached by Abdullahi et al. (2023). A correlation was shown between firms that allocated resources toward improving EE and their subsequent achievement of improved EP results. The close closeness between the mean (0.284) and the beta value (0.280) highlights the strength of the influence of EE on EP, although significantly lower than the impact of CC. The little variation seen may be ascribed to the varying significance of these characteristics across various businesses or environments, thereby necessitating more investigation.

The third hypothesis reveals a significant statistical relationship between LHT and EP, as shown by a t -value of 2.778 and a p -value of 0.006. The present observation is noteworthy as it aligns with the conclusions drawn in the research conducted by Ololade et al. (2023), which suggested that variables such as LHT may have a significant influence on EP. It is worth mentioning that there is a significant similarity between the mean value (0.253) and the beta coefficient (0.261), indicating a strong linear relationship between LHT and EP. Considering the growing global focus on strategic planning with

TABLE 10 Mean, STDEV, T values, p values, decision.

No	Hypothesis	β	μ	SD	T value	p values	Decision
H1	CC → EP	0.268	0.273	0.086	3.106	0.002	Supported
H2	EE → EP	0.280	0.284	0.111	2.532	0.012	Supported
H3	LHT → EP	0.261	0.253	0.094	2.778	0.006	Supported
H4	PA → EP	0.067	0.064	0.061	1.100	0.272	Not Supported

EE, Employee Efficiency; CC, Communication and Collaboration; LHT, Level of HRIS Training; PA, Performance Analysis; EP, Employee Performance.

Beta (β); Values from -1 to $+1$. Assess significance and confidence intervals. p -values; Significance value is based on the degrees of freedom $p < 0.05$ (Cheah, 2020).

long-term perspectives, it is reasonable to recognize the significance of this outcome.

The suggested impact of PA on EP, on the other hand, seems to be unsupported in the present study. The estimated t -value of 1.100 and the much higher p -value of 0.272 show an insignificant connection. This finding contradicts prior claims made by Charles and Ochieng (2023) who claimed that PA had a significant impact on EP. The gap in results might be related to methodological discrepancies, contextual variables, or even shifting dynamics in the market.

The inconsistency with past research suggests two possibilities: either PA's influence on EP is indeed minor, or the present dataset and context analyzed are not suitable for exposing this relationship. As Albert Einstein famously said, "Absence of evidence is not evidence of absence." Thus, although the present dataset's findings do not support the impact of PA on EP, it would be unfair to dismiss its potential relevance, particularly given contradictory evidence in earlier studies.

As the current data are compared to previous research, the main disparity is in the PA and EP relationship. Inconsistencies such as these are common in empirical research and may be attributed to differing sample sizes, regional settings, industry-specific subtleties, or time-period concerns.

Based on the findings that have been addressed, it is apparent that CC, EE, and LHT play a significant role in affecting EP. However, the lack of conclusive proof about the effects of Performance Analysis necessitates a more thorough examination. It is essential for decision-makers and researchers to carefully evaluate these data, particularly when formulating strategies, interventions, or future research priorities. Most of the attention should be placed on identifying the elements that have the most significant impact, enabling informed and strategic decision-making in the realm of EP.

5.1 Limitations

The conclusions of the research are predicated upon a particular dataset, therefore potentially limiting their generalizability to other groups or circumstances. Insufficient details were provided on the sample size, possible biases, and measuring procedures, hence potentially impacting the validity and reliability of the findings. Furthermore, while the effect of PA on EP was not shown to be statistically significant in the present dataset, it is important to acknowledge that this does not exclude the possibility of its influence in other contexts or under alternative circumstances.

5.2 Recommendations

It is recommended that future research endeavors use varied datasets to enhance the generalizability of their results. The use of several analytical techniques might potentially enhance the comprehension of the function of PA's role concerning EP. It is of utmost importance to give priority to initiatives targeting established elements, including CC, EE, and LHT, while simultaneously investigating the potential impact of public awareness of PA in particular contexts.

5.3 The implication

The findings of the research emphasize the significant impact of Communication and Collaboration (CC), Employee Engagement (EE), and Level of HRIS Training (LHT) on enhancing Employee Performance (EP). These characteristics play a crucial role in determining the success of a business. Nevertheless, the dearth of robust information pertaining to the influence of Performance Analysis (PA) necessitates more inquiry. When formulating plans, decision-makers need to give careful consideration to prioritizing CC (Communication and Collaboration), EE (Employee Efficiency), and LHT (Level of HRIS Training). It is essential to recognize that study outcomes may exhibit variability as a result of contextual influences, hence underscoring the need for methodologies adapted to individual contexts. The aforementioned insights serve as a fundamental basis for making well-informed decisions, developing strategic plans, and identifying future research avenues within the area of EP.

6 Conclusion

The hypotheses under examination provide statistical evidence that supports the existence of positive relationships between CC, EE, and LHT with EP, hence indicating their substantial effect. Nevertheless, the empirical evidence supporting the supposed relationship PA and EP is insufficient, since the observed level of significance is beyond the accepted threshold. While this does not invalidate a potential correlation PA and EP, it emphasizes that the relationship is not apparent within the dataset provided. Therefore, it is evident that CC, EE, and LHT play significant roles in the setting of EP. However, further study is required to fully comprehend the precise function and significance of PA. It is important for decision-makers to accord priority to these results when formulating strategies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

AA: Writing – original draft, Software, Resources, Formal analysis, Project administration, Visualization, Supervision, Methodology, Validation, Conceptualization, Investigation, Data curation. MA: Conceptualization, Investigation, Writing – review & editing, Funding acquisition, Project administration, Supervision, Validation, Visualization. MAA: Writing – review & editing, Supervision, Funding acquisition, Resources, Conceptualization, Validation. NA: Supervision, Writing – review & editing, Investigation, Funding acquisition, Project administration, Validation, Resources.

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Conflict of interest

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