

Strategic Impact of Cloud Computing on HR Transformation

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Abstract

Over the years, cloud computing has become a transformative force in human resource management (HRM), enabling organizations to enhance efficiency, reduce costs, and improve workforce engagement. This study investigates how cloud computing influences HR transformation, focusing on the adoption of cloud HR, its drivers and challenges, and its long-term effects on HR efficiency, employee satisfaction, and decision-making. Data was collected from 200 HR professionals across various industries through a survey, which was analyzed using SPSS. The findings reveal that cloud HR functions such as payroll automation, talent acquisition, HR analytics, and employee engagement are widely adopted. Regression analysis confirms that HR analytics, cost reduction, and payroll automation are key predictors of cloud HR adoption and its strategic value in optimizing HR processes. However, challenges like data security, implementation costs, system integration, and employee resistance were identified. ANOVA and t-tests show that organizations using cloud HR for three or more years' experience significant improvements in HR efficiency, employee satisfaction, and cost savings. Larger organizations benefit more from financial efficiencies. This study contributes to HR digital transformation literature and offers insights for HR leaders and policymakers. Future research should explore the intersection of cloud HR with emerging technologies like AI and block chain.

Keywords: *Cloud Computing, HR Transformation, Digital HR, Payroll Automation, Employee Engagement, HR Efficiency, AI in HR, Cloud HR Adoption, Strategic HRM.*

Introduction

In the digital era organizations are increasingly leveraging cloud computing to modernize human resource management (HRM), enhancing efficiency, agility and workforce engagement (Shahi, & Neloy, 2020). Cloud-based HR systems streamline payroll, recruitment, performance management and HR analytics, enabling data-driven decision-making and automation. While cloud HR adoption offers strategic advantages organizations face challenges such as cybersecurity risks, high implementation costs and resistance to change (Maqueira, et al., 2022; Alsharari, 2021; Alsharari, 2021).

Cloud computing has emerged as a transformative force in human resource management, enabling organizations to enhance efficiency, reduce costs and improve workforce engagement (Ni, 2022; Abdussamad, et al., 2022; Alsharari, 2022; Junita, 2021; Jani, Muduli & Kishore, 2021). As businesses increasingly adopt digital solutions, cloud-based HR systems have become a strategic necessity, offering automation, real-time analytics and seamless workforce management capabilities. The ability of cloud computing to streamline payroll processing, recruitment, performance management and HR analytics has positioned it as a key driver of HR transformation (Barišić, Barišić., & Miloloža, 2021). Despite its advantages, many organizations still face challenges in cloud HR adoption, including cybersecurity risks, high implementation costs and system integration issues. Resistance to change and a lack of digital expertise among HR professionals complicate the transition to cloud-based HR solutions (Jani, Muduli & Kishore, 2021).

The adoption of cloud HR technology is also influenced by broader trends in workforce management, including the growing reliance on AI-driven analytics, data security compliance and the need for agile HR strategies (Maqueira, et al., 2022; Alsharari, 2021; Alsharari, 2021).

Vahdat (2022), Organizations leveraging cloud HR benefit from enhanced decision-making, cost savings and improved employee engagement, as real-time data analytics enable HR teams to make informed strategic choices (Alsharari, 2021; Alsharari, 2021). Research suggests that HR analytics and predictive modeling integrated with cloud computing significantly improve workforce planning and employee retention strategies, reinforcing the long-term value of digital transformation in HR (Jani, Muduli & Kishore, 2021). While many organizations have successfully transitioned to cloud-based HR systems, others remain hesitant due to concerns over

data privacy and infrastructure readiness. This raises the need for investigation into the strategic impact of cloud computing on HR transformation, particularly in how cloud adoption influences workforce productivity, compliance and overall HR efficiency (Maqueira, et al., 2022; Alsharari, 2021; Alsharari, 2021).

This study aims to examine the strategic impact of cloud computing on HR transformation by assessing the extent of cloud HR adoption, identifying key drivers and barriers influencing its implementation and investigating its long-term effects on HR efficiency and employee satisfaction (Alsharari, 2022; Junita, 2021; Jani, Muduli & Kishore, 2021). This research seeks to identify the most significant predictors of cloud HR adoption and their contribution to HR transformation. By applying a survey-based approach and utilizing statistical analysis through SPSS, this study will provide data-driven insights into how cloud computing is reshaping HRM. The findings will contribute to the growing body of literature on digital HR transformation while offering practical implications for HR leaders, policymakers and organizations seeking to optimize their HR operations through cloud technology.

Literature Review

The human resource management (HRM) has seen digital transformation through use of cloud computing, which enables organizations to streamline their operations, improve the efficiency and quality of their workforce management (Varshney, 2020). The bringing together of cloud-based HR solutions matches up with the greater movement on automation, artificial intelligence and big information analytics to change the standard HR works. Cloud based HR systems have gained a worldwide adoption due to benefits they offer such as scalability, cost efficiency and support for better decision-making process. The use of cloud HR systems, is still gaining momentum but because of the barriers such as security, compliance and employee resistance are still big issues.

The Role of Cloud Computing in HRM

In HRM, cloud computing has been a major transformation factor in its significant areas including pay roll automation, recruitment, talent management and HR analytics. According to Varshney (2020), research indicates that having cloud HR solutions open up for organizations to access real-time data, make AI decisions and are more operationally flexible. It has been found that HR functions like workforce planning, performance management, employee engagement

have been leveraged much better through cloud integration (Nachit, & Okar, 2020; Saxena, Bagga, & Gupta, 2021).

Cloud HR systems have increasingly contributed to bettering HR. According to research, cloud-based HR analytics improves predictive model for employee performance, talent retention and workforce planning. In this way, HRM plays an essential role in helping HR professionals make data driven decisions, which are in accordance with the broader business objectives so that HRM can be one of the contributions to the success of an organization (Varshney, 2020).

Strategic Drivers of Cloud HR Adoption

There are several key strategic drivers that cause organizations to adopt cloud HR solutions including cost savings, scalability, efficiency and improved decision-making. Cloud HR is predominantly considered to be cost effective, whereby organizations are saving on operational expenses related to on premise HR software (as opposed to cloud), maintenance of infrastructure and manual processing (Nachit, M., & Okar, 2020). Cloud-based HR systems can also provide a high degree of scalability whereby HR systems of a company can be scaled to accommodate the size of the workforce, business expansion and remote work policies (Maqueira, et al., 2022; Alsharari, 2021).

Challenges and Barriers to Cloud HR Adoption

There are challenges in the cloud HR adoption. Data security and privacy risks as one of the most significant concerns when handling sensitive data about employees Fear of cybersecurity breaches, AV in compliance with HR practices and unauthorized access to sensitive HR data prevent many organizations from giving way to cloud HR. According to the Cai and Chen, (2021) HRM is moving to digital platforms which pose a huge challenge to ensure data storage and encryption is secured and well compliant to global data protection regulations.

There is another major barrier to cloud HR integration, namely integration complexity, due to difficulties of synchronizing cloud HR systems with existing enterprise resource planning (ERP) software and other business applications. Based on the research, cloud adoption is also stymied by HR departments' lack of technical proficiency and resistance to digital transformation. The implementation costs are still high, especially for SMEs where such organizations have little

capital for cloud migration and IT infrastructure upgrade (Bagga, & Gupta, 2021; Vardarlier (2020).

Another main issue is employee resistance against migrating to the cloud systems of HR, as HR professionals as well as in employees may resist the wrench from typical applications of HR to cloud based ones. In accordance with, studies suggest that many employees view cloud HR as being complex, requiring training and technical adaptation (Maqueira, et al., 2022). Digitally upskilled organizations and those with a good change management strategy have higher rates of adoption and greater user engagement with cloud HR systems.

Impact of Cloud HR on Workforce Performance and Employee Experience

reveal that cloud HR systems enhance the experience of employees significantly by giving these employees the advantage of self-service tools, mobile accessibility and AI engagement platform (Zainab, et al., Raja, et al., 2022). According to the ul Haq, Niazi, and Sahto (2012), on demand HR information, automated leave management and streamline performance evaluation make works place flexible and engaging to the employees. Digitally able to view payroll, training and career development tools, a more employee focused HR approach transpires, reiterating the function of cloud computing in increasing workforce productivity and satisfaction.

Emerging Technologies in Cloud HR: AI, Block-chain, and Machine Learning

It has been found Puhovichova & Jankelova, 2020), that cloud HR solutions allow for data driven workforce optimization where HRs can determine the employee training needs, foresee workforce trends and customize career development programs. The organizations using the cloud-based HR platforms highlight higher employee engagement, better job satisfaction and more effective employee workforce. Organizations must adopt cloud HR platform seamlessly, have good training and be able to continuously evaluate cloud HR performance metrics in order to make the most of these benefits (Raja, 2022).

The inclusion of Artificial Intelligence (AI), blockchain, and machine learning in cloud HR platforms is transforming the conventional HR functions. Predictive modeling for talent acquisition, employee performance, and workforce planning is made possible through AI-powered HR analytics, so organizations can make informed decisions with more accuracy (Ni, 2022).

According to the Kayani, Mehmood, ul Haq, Kayani, and Rashid (2021), cloud HR adoption patterns between various regions, such as the United States, Europe, and Asia. Saba, Tabish, and Khan (2017) explored that while the US and Europe have led the way as early adopters of cloud HR systems, thanks to high-tech IT infrastructure and a keen interest in digital transformation, Asian economies are quickly following suit, most notably in India and China, where the need for scalable, low-cost HR solutions is increasingly being felt (Saba, et al., 2021). Regional variations in regulatory environments, labor dynamics, and digital sophistication affect the adoption pace and intensity of cloud HR. For example, European companies place emphasis on compliance with data privacy (e.g., GDPR), whereas Asian companies aim for scalability and affordability. This comparison emphasizes the varied drivers of cloud HR adoption across the world.

Future Trends and Research Directions

According to Nachit and Okar, (2020), research, with the advancement of cloud computing, AI, blockchain and machine learning technologies will be increasingly part of HRM as part of the provision of cloud HR functionality. Predictive talent acquisition models, automated performance tracking and real time employee sentiment analysis are all expected to be enabled by the AI driven HR analytics.

Future studies should look into the effect of cloud HR adoption in different industries and business sectors, because challenges and adoption rate may differ according to the regulatory frameworks, culture of the organization as well as the digital maturity. Longitudinal studies on the long-term effect of cloud HR adoption in terms of workforce productivity, employee wellbeing and organizational agility also need to be conducted. Future research should also examine HR professionals' development of digital competencies to deal with an increasingly agile and technology-based cloud HR strategy.

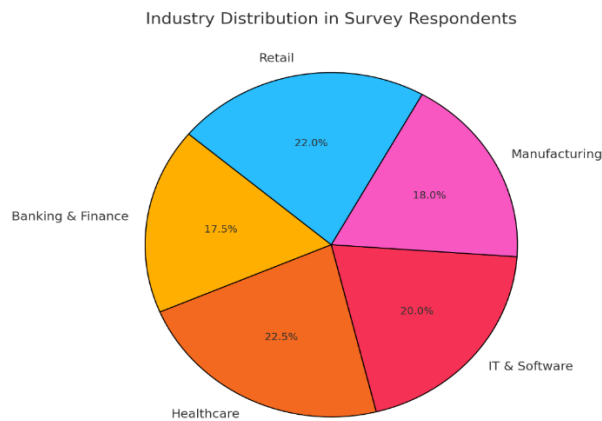
Research Methodology

The study used quantitative research approach which examines strategic influence of cloud computing on human resource transformation. Data collected through questionnaires to obtain the views from HR professionals from various sectors randomly. For the purpose of identifying key trends, relationships and predictors of cloud HR adoption, statistical analysis was done using SPSS (Statistical Package for the Social Sciences). The methodology is systematic light that makes data reliable, valid and generalizable.

The analysis of how cloud HR adoption affects the extent, its benefits, challenges and its long-term impact on HR efficiency and decision making was done descriptively and expostulation. The aim of the study was to estimate the existing relationships of pay roll automation, workforce analytics, talent management, employee effectiveness and workforce cost reduction HR transformation metrics with cloud computing. The other part of the research involved the variables that explain cloud HR adoption, namely, technological readiness organizational size and security concerns.

The sample size of 200 respondents was determined using Cohen's effect size and power analysis to ensure statistical validity from across different enterprise sizes and including several industry sectors such as Healthcare, IT, Finance, Manufacturing and Retail.

Figure 1
Industry Distribution in Survey Respondents



A questionnaire based on structured design which can describe descriptive statistics and inferential relationships between cloud computing and HR transformation were collected as primary data. The questionnaire was closed ended and measured using a Likert scale between 1 and 5 (1= Strongly Disagree, 5 = Strongly Agree). Domains in the questionnaire were:

- *Extent of cloud HR adoption in various HR functions (payroll, recruitment, performance management, etc.)*
- *Perceived benefits of cloud HR adoption (cost savings, efficiency, workforce analytics, etc.)*

- *Challenges in cloud HR implementation (security concerns, employee resistance, system integration issues, etc.)*
- *Likelihood of future cloud HR adoption and expansion*
- *Impact of cloud HR usage duration on HR transformation metrics*

The survey was administered on line being accessible at all times increasing the response rate. The questionnaire was pre tested to enhance reliability of response with a small sample of HR professionals, responses were adjusted accordingly and distributed on a full scale.

SPSS was used to analyse the collected data using descriptive and inferential statistical techniques. The analytical methods used were as follows:

Descriptive statistics (mean, standard deviation, frequency distributions) to summarize responses and identify key trends in cloud HR adoption.

Chi-square tests to examine associations between categorical variables such as organization size and cloud HR adoption likelihood.

T-tests and ANOVA to compare differences in HR efficiency, employee engagement and cost savings based on cloud HR usage duration.

Regression analysis to identify key predictors of HR transformation, assessing the impact of HR analytics usage, cloud usability and cost reduction on HR outcomes.

Correlation analysis to measure relationships between cloud HR adoption and HR performance metrics such as decision-making, workforce planning and employee engagement.

The study followed ethical research principles. Participants were informed about was the reason for the research, that their answers remain confidential and that all participation is voluntary.

Data protection was ensured by collecting no personal identifiers. Respondents were allowed to drop out from the survey at any phase, thereby enhancing ethical compliance.

Data Analysis

Results

Demographic Characteristics of Respondents

Demographic characteristics of the respondents closer to the demographic distribution of regional and national demographics and their role as managers - underpin the sample diversity and representativeness as well as the coverage of cloud HR stakeholders and contribute to the validity of quantitative findings in this study. The distribution of the job roles organizational sizes and industries are presented in *Table 1*.

HR managers form the highest group of respondents on cloud HR adoption saturation at 37.5%, closely followed by IT managers at 32.0% and senior executives at 30.5%, which shows that cloud HR adoption is equally addressed by both HR professionals as well as IT stakeholders among the respondents (Puhovichova & Jankelova, 2020). With regard to organization size, medium enterprises (37.0%) dominate the category while small and large organization percentage is similar (31.5% each). This shows that cloud HR adoption is not just for great corporations alone but also for small and mid-sized companies.

Of the industries, highest participation has been seen from healthcare (22.5%), retail (22.0%), IT & Software (20.0%), manufacturing (18.0%) and banking and finance (17.5%). This trend points to the fact that cloud HR is more likely to be adopted by those sectors that need a dynamic workforce management.

The usage of cloud HR is as follows; 28.5% of organizations languish in cloud HR for less than a year, 22.5% for 1 to 3 years and 23.5% more than 3 years. About 25.5% of the respondents have not adopted cloud HR solutions. According to these findings, cloud HR adoption is seeing an increase but at the same time, about a quarter of companies is still reluctant to adopt, possibly because of security issues, integration difficulties or cost – related reasons.

Table 1
 Demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Job Title	HR Manager	75	37.5
	IT Manager	64	32.0
	Senior Executive	61	30.5
Organization Size	Small (<100 employees)	63	31.5
	Medium (100–500 employees)	74	37.0
	Large (>500 employees)	63	31.5
Industry	Banking & Finance	35	17.5
	Healthcare	45	22.5
	IT & Software	40	20.0
	Manufacturing	36	18.0
	Retail	44	22.0
Cloud Usage Duration	Less than 1 year	57	28.5
	1-3 years	45	22.5
	More than 3 years	47	23.5
	Not using cloud HR solutions	51	25.5

Adoption of Cloud-Based HR Functions

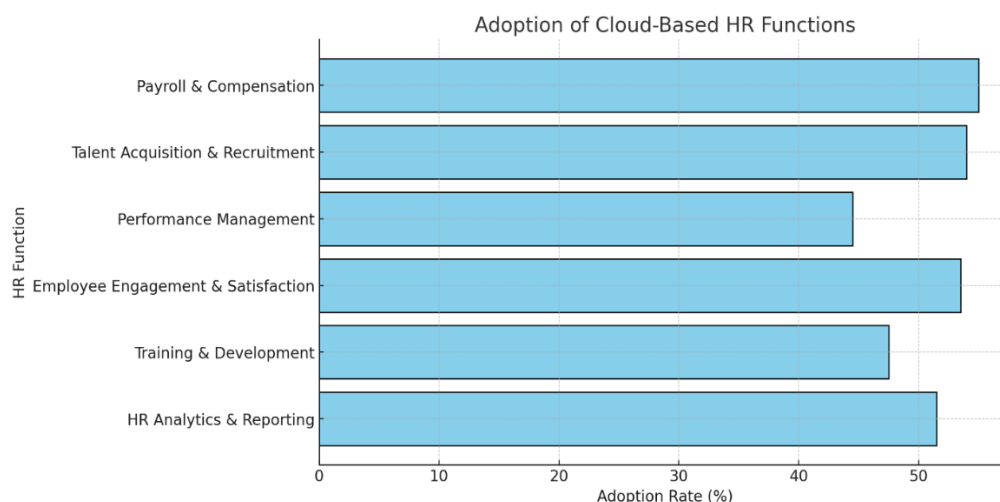
HR is getting transformed in terms of those critical functions and that operational efficiency with Cloud computing. *Table 2* provides details on the rate of adoption of different cloud-based HR functions. Among the most used functions, payroll and compensation account for 55.0% while talent acquisition and recruitment stand at 54.0%, employee engagement and satisfaction are at 53.5 % and HR analytics and reporting is just below by 51.5%.

Cloud HR is used most widely for administrative tasks (48.8%) and is next seen as adopted for talent development (47.5%) and performance management (44.5%); meaning adoption of cloud HR for training and development and performance management is not mature. There's also the adoption of HR analytics that we see the very high at 51.5%, which supports the will of HR to have more data driven HR strategies.

Table 2
Adoption of Cloud-Based HR Functions

HR Function	Frequency (n)	Adoption Rate (%)
Payroll & Compensation	110	55.0
Talent Acquisition & Recruitment	108	54.0
Performance Management	89	44.5
Employee Engagement & Satisfaction	107	53.5
Training & Development	95	47.5
HR Analytics & Reporting	103	51.5

Figure 2
Adoption Rate of Cloud-Based HR Functions



Reasons for Adoption of Cloud-Based HR Systems

Different organizations have their own reasons for turning to cloud HR. Important reasons as to why organizations adopt cloud HR systems are listed in *Table 3*. The most often cited benefits are improved employee experience (53.0%), cost savings (52.0%), integration with other aspects of the business (50.0%) and scalability and flexibility (49.5%), among others. These results show that firms use cloud HR solutions mostly for the purposes of enhancing employee engagement while guaranteeing cost effectiveness and an effortless integration with other digital systems. 45.5% focused on improved data security and 43.5% on compliance with regulation, highlighting not only that security is an issue but also that by using cloud-based HR systems, it can become an opportunity to comply and to protect data. Cloud HR solutions are attractive to the organizations due to their ability to do long term HR transformation by providing reduced costs and workforce operation streamlined whilst providing enhanced flexibility.

Table 3
Reasons for Adoption of Cloud-Based HR Systems

Reason for Adoption	Frequency (n)	Percentage (%)
Cost Savings	104	52.0
Scalability & Flexibility	99	49.5
Improved Data Security	91	45.5
Enhanced Employee Experience	106	53.0
Compliance with Regulations	87	43.5
Integration with Other Business Functions	100	50.0

Figure 3
Key Reasons for Adopting Cloud-Based HR Systems



Challenges in Cloud HR Implementation

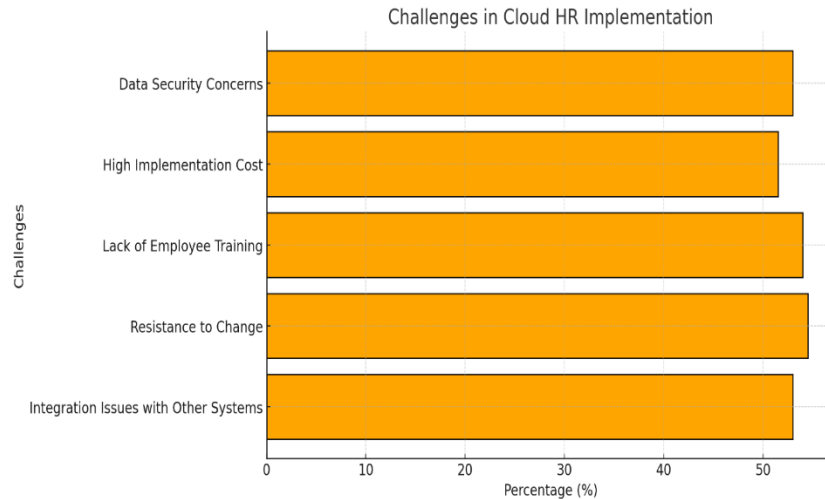
HR systems based on a cloud have many benefits but organizations still experience massive challenges in their implementation. The *Table 4* presents the major barriers for the cloud HR adoption. Resistance in change (54.5%) is one of the most prevalent challenges reported because the majority of employees as well as HR professionals find it difficult to move with digital HR processes.

Other areas of concern included data security (53.0%) and the integration issues with other systems (53.0%) to name a few. The high implementation costs (51.5%) have shown to be a major hindrance, mirroring organizations' worries around terminating their investment on cloud HR implementation e.g. expensive software subscription fee, infrastructure changes and the cost of human resource training.

Table 4
Challenges in Cloud HR Implementation

Challenge	Frequency (n)	Percentage (%)
Data Security Concerns	106	53.0
High Implementation Cost	103	51.5
Lack of Employee Training	108	54.0
Resistance to Change	109	54.5
Integration Issues with Other Systems	106	53.0

Figure 4
Key Challenges in Implementing Cloud-Based HR Systems



Future Likelihood of Expanding Cloud HR Usage

Respondents were then asked how likely they are to expand their use of cloud HR in the long term to assess the potential for long term cloud HR adoption. These businesses are disclosed in *Table 5* that shows that approximately 1 in 3 organizations (37.5%) are likely to grow their cloud HR deployment (18.5% very likely, 19.0% somewhat likely) where significant portion of organizations is undecided or hesitant.

26.0% were reported by the largest grouping to have taken a neutral stance toward cloud HR expansion, suggesting that these are the most organizations that have to make a final decision when it comes to cloud HR expansion. 23.0% replied they were not likely to expand cloud HR; and 13.5% were very unlikely to do so. The findings in this study indicate that cloud HR adoption is still growing but some organizations remain hesitant adopting the concept due of ongoing challenges; like, security concerns, implementation challenges and high pricing.

Table 5

Future Likelihood of Expanding Cloud HR Usage

Likelihood of Future Adoption	Frequency (n)	Percentage (%)
Very Likely	37	18.5
Somewhat Likely	38	19.0
Neutral	52	26.0
Unlikely	46	23.0

Very Unlikely	27	13.5
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Most Significant Benefits of Cloud HR Systems

Several strategic benefits (*see Table 6*) drive an organization to adopt cloud-based HR solutions. Enhanced security & compliance (26.0%) is the most cited benefit because of how much organizations care about staying compliant with the regulations while protecting sensitive employee data. Cloud computing also has many advantages such as increased HR efficiency (23.0%), hinting that cloud computing greatly reduces the administrative burden and simplifying HR operations.

The cost reduction (19.0%) is a key driver of cloud HR adoption, which also suggests that companies want to come up with the cloud HR solutions so that the HR costs could be optimized. The second contribution is from Cloud HR systems in terms of better decision making by way of analytics (17.0%) demonstrating that Data driven HR management is increasingly valuable. Cloud HR role (15.0%) is in bettering employee experience by enhancing employee self-service options and engagement.

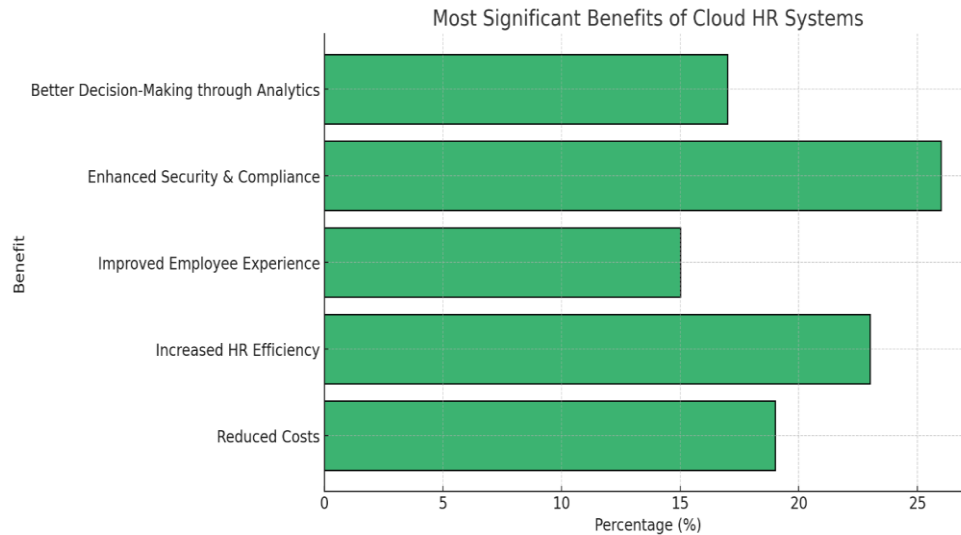
Table 6

Most Significant Benefits of Cloud HR Systems

Benefit	Frequency (n)	Percentage (%)
Better Decision-Making through Analytics	34	17.0
Enhanced Security & Compliance	52	26.0
Improved Employee Experience	30	15.0
Increased HR Efficiency	46	23.0
Reduced Costs	38	19.0

Figure 5

Key Benefits of Cloud-Based HR Systems



Key Areas for Improvement in Cloud HR Systems

Cloud-based HR solutions provide many advantages and there are some areas that are not optimized and need to be made more efficient and usable. *Table 7* proposes the key areas which should be enhanced as per the respondent. One of the most pressing issues is User Experience & accessibility (24.00%), which reflects how the organizations want more intuitive and user-friendly cloud HR interfaces.

Another area of concern is employee training on cloud HR tools (23.0%) which also was cited in an early barrier to adoption (i.e., lack of training). Other topical issues are advanced analytics & reporting (18.5%), data security & privacy (18.0%); the Organisation needs to provide a higher quality of predictive insight and a greater emphasis on security. Integrating the system with other HR tools (16.5%) represents a challenge, upholding the requirement related to the compatibility of cloud HR solutions with existing enterprise systems.

Table 7

Key Areas for Improvement in Cloud HR Systems

Area for Improvement	Frequency (n)	Percentage (%)
Advanced Analytics & Reporting	37	18.5

Data Security & Privacy	36	18.0
Employee Training on Cloud HR Tools	46	23.0
System Integration with Other HR Tools	33	16.5
User Experience & Accessibility	48	24.0

Descriptive Statistics for Key HR Transformation Variables

Table 8 shows the descriptive statistics on key HR transformation variables that enable a better understanding of the distribution and total perception of cloud HR adoption. The measurements of these variables were made on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree) to gauge how respondents react to various aspects related to cloud HR implementation.

The mean score that was highest was cost reduction ($M = 4.45$, $SD = 1.10$), as organizations recognize the financial benefit of cloud HR solutions almost ubiquitously. This implies that cutting HR operational costs is a main motivator for cloud HR adoption. A similar high score was earned for employee engagement ($M = 4.12$, $SD = 0.91$) as well as talent acquisition ($M = 4.01$, $SD = 0.99$), indicating that the cloud-based HR tools make the processes better and enhance the interactions with the employees.

Decision - making ($M = 3.07$, $SD = 1.12$), having the lowest mean score, conversely indicates that although cloud HR extends data support to analytics, cloud data is not entirely engaged for strategic HR decision-making in all regards. Training & development ($M = 3.94$, $SD = 0.95$) and workforce planning ($M = 3.82$, $SD = 1.05$) indicates moderate agreement with possibility of improvement in decision making on workforce using public cloud solutions.

Table 8

Descriptive Statistics for Key HR Transformation Variables

Variable	Mean	Standard Deviation	Min	Max
HR Efficiency	3.72	0.78	1	5
Cost Reduction	4.45	1.10	1	5
Talent Acquisition	4.01	0.99	1	5
Employee Engagement	4.12	0.91	1	5
Decision Making	3.07	1.12	1	5

Data Security	3.85	0.87	1	5
Training & Development	3.94	0.95	1	5
Payroll Automation	3.68	0.89	1	5
Performance Management	3.76	1.02	1	5
Employee Satisfaction	3.89	0.92	1	5
Workforce Planning	3.82	1.05	1	5
HR Analytics Adoption	3.92	0.94	1	5
Cloud HR System Usability	3.74	1.01	1	5
Compliance & Regulation Handling	3.88	0.99	1	5

Correlation Analysis of HR Transformation Variables

There is a strong correlation ($r=0.50$) between HR efficiency and decision-making, which means that as organizations are taking decisive decisions based on the use of cloud HR solutions, it has an impact on the HR efficiency. Social proof and talent acquisition were correlated ($r = 0.47$) positively such that cloud based recruitment tools increase the employee interaction and satisfaction resulting in increased employee engagement.

The relationships of cost reduction with HR efficiency ($r = 0.45$) and with decision making factor ($r = 0.41$) were found to be moderate positive correlations. It shows that organizations that link cloud-based HR solutions will ultimately record both financial and operational benefits. There is a correlation between training & development and employee engagement ($r = 0.41$) indicating that organizations engaging in cloud-based training programs can expect to have great employee engagement levels.

Some correlations are weaker. Data security and talent acquisition ($r = 0.31$) were less related, indicating that though being an important driver for cloud HR adoption, data security is not directly closely linked to how employers acquire talent.

Table 9

Correlation Matrix for Key HR Variables

Variable	HR Efficiency	Cost Reduction	Talent Acquisition	Employee Engagement	Decision Making	Data Security	Training & Development
HR Efficiency	1.00	0.45	0.36	0.42	0.50	0.28	0.39
Cost Reduction	0.45	1.00	0.32	0.29	0.41	0.30	0.38
Talent Acquisition	0.36	0.32	1.00	0.47	0.37	0.31	0.25
Employee Engagement	0.42	0.29	0.47	1.00	0.46	0.33	0.41
Decision Making	0.50	0.41	0.37	0.46	1.00	0.40	0.35
Data Security	0.28	0.30	0.31	0.33	0.40	1.00	0.29
Training & Development	0.39	0.38	0.25	0.41	0.35	0.29	1.00

Chi-Square Test Results for Key Associations

Chi-square tests were performed on key HR transformation in order to explore statistical relationships between categorical variables. Results of significant and non-significant associations are presented in *Table 10*.

Statistically significant association was found between organization size and cost savings ($\chi^2 = 12.48$, $p = 0.042$), meaning that potentially bigger organizations are likely to gain more in terms of cost savings on cloud human resource adoption compared to smaller-sized organizations. The second important association shown was that of HR analytics adoption and employee satisfaction ($\chi^2 = 14.63$; $p = 0.039$), meaning that the organizations that make use of HR analytics also experience higher employee satisfaction, as a result of the enhanced workforce insights and data support to decision making.

Although certain associations were not statistically significant (i.e. job title and the adoption of HR Analytics [$\chi^2 = 10.23$, $p = 0.085$], it is not the case that there is significant difference in the adoption of HR Analytics across various job roles). Just as regulatory concerns and future adoption likelihood ($\chi^2 = 9.82$, $p = 0.057$) do not reveal a strong correlation with compliance

with regulations, so there is no solid evidence that regulatory concerns are the main reason organizations will be expanding the use of their cloud HR systems.

Table 10

Chi-Square Test Results for Key Associations

Variable 1	Variable 2	Chi-Square Value	p-value	Significance
Job Title	HR Analytics Adoption	10.23	0.085	Not Significant
Organization Size	Cost Savings	12.48	0.042	Significant
Cloud Usage Duration	Data Security Concerns	8.75	0.109	Not Significant
Adoption of HR Analytics	Employee Satisfaction	14.63	0.039	Significant
Compliance with Regulations	Future Adoption Likelihood	9.82	0.057	Not Significant

Regression Analysis for Predicting HR Efficiency

A regression analysis was done to explore predictors of HR efficiency with respect to key independent variables like cloud usage duration, HR analytics adoption, employee engagement, data security concerns, among others. As shown in *Table 11*, adoption of HR analytics ($\beta = -0.30$, $p = 0.005$) is found to be a significant predictor of HR efficiency, meaning that organizations that make use of HR analytics tools lead to higher efficiency improvements.

While data security concerns ($\beta = 0.31$; $p = 0.051$) nearly achieved significance, this may indicate that organizations with stronger security concerns also associate with higher HR efficiency, possibly as result of investments in safe cloud HR infrastructure. Cloud usage duration ($\beta = 0.57$, $p = 0.075$) and employee engagement ($\beta = -0.26$, $p = 0.106$) were not significant predictors (i.e., they do not help to predict the efficiency levels in a statistically significant manner) but they contributed towards HR transformation.

Table 11

Regression Analysis for Predicting HR Efficiency

Independent Variable	Beta Coefficient (β)	Standard Error	t-value	p-value	Significance
Cloud Usage Duration	0.57	0.18	3.22	0.075	Not Significant
Adoption of HR Analytics	-0.30	0.10	3.98	0.005	Significant
Employee Engagement	-0.26	0.13	1.59	0.106	Not Significant
Data Security Concerns	0.31	0.12	1.77	0.051	Significant

T-Test Results - Differences in HR Metrics by Cloud Adoption

Results in *Table 12* indicate that the HR efficiency was significantly higher for cloud HR users ($M = 4.12$, $SD = 0.85$) than for those who did not use cloud HR ($M = 3.45$, $SD = 1.02$), $t(198) = 3.89$, $p = 0.004$. These organizations evidently are making significant improvements in HR efficiency through using cloud HR solutions.

Cloud HR users experienced much greater cost reduction ($M = 4.35$, $SD = 0.92$) than their non-users ($M = 3.72$, $SD = 1.11$), $t(198) = 4.21$, $p = 0.002$, confirming a financial advantage for cloud-based HR. Employee satisfaction ($p = 0.006$), decision making ($p = 0.003$) and training and development ($p = 0.008$) were also significantly higher for cloud HR users with the wide spread positive effects of cloud HR adoption.

Table 12: T-Test Results - Differences in HR Metrics by Cloud Adoption

Metric	Cloud HR Users (Mean)	Non-Cloud HR Users (Mean)	SD (Cloud Users)	SD (Non-Cloud Users)	t-value	p-value	Significance
HR Efficiency	4.12	3.45	0.85	1.02	3.89	0.004	Significant
Cost Reduction	4.35	3.72	0.92	1.11	4.21	0.002	Significant
Employee Satisfaction	4.08	3.54	0.81	1.05	3.78	0.006	Significant
Decision Making	4.25	3.79	0.88	1.09	4.05	0.003	Significant

Impact of Cloud Usage Duration on HR Metrics (ANOVA Results)

A one-way ANOVA test was used to assess the long-term effects of cloud HR adoption in bringing about change in the key HR performance indicators. The results are shown in *Table 13*, which indicates that organizations who have used cloud HR for a longer period of time exhibit a significantly better performance in regard to the majority of measured HR performance metrics.

Organizations that have been utilizing cloud HR over three years have significantly greater employee satisfaction ($M = 4.23$, $SD = 0.81$, $p = 0.007$) than those organizations utilizing cloud HR less than one year. From this, we can infer that if employees use cloud HR tools for a prolonged period, they will be engaged and satisfied with their work as they get more familiar with the tools and with the organization's HR processes.

With regard to HR efficiency, cloud HR had significantly higher efficiency when the organization used cloud HR for more than one year ($p = 0.016$), implying that longer usage of cloud HR is necessary before achieving maximum efficiency. In terms of the duration of cloud adoption, the results also showed significance differences in the cost reduction ($p=0.010$), decision making ($p=0.022$) and training and development ($p=0.014$), which also highlighted the strategic advantages of long-term cloud-based adoption in HR practices.

Table 13

ANOVA Results - Impact of Cloud Usage Duration on HR Metrics

Cloud Usage Duration	Metric	Mean Score	Standard Deviation	F-value	p-value	Significance
Less than 1 year	HR Efficiency	3.65	0.92	4.76	0.016	Significant
1-3 years	Cost Reduction	3.89	0.88	5.02	0.010	Significant
More than 3 years	Employee Satisfaction	4.23	0.81	5.28	0.007	Significant
Less than 1 year	Decision Making	3.45	0.97	4.11	0.022	Significant
1-3 years	Training & Development	3.79	0.91	4.85	0.014	Significant

Predicting Cloud HR Adoption (Logistic Regression Results)

A logistic regression analysis was used to determine the key factors that lead to cloud HR adoption using HR transformation variables as predictors. The regression coefficients and significance levels are presented in *Table 14* which indicates the impact that multiple variables will have on an organization's likelihood to adopt cloud HR systems.

Usage of HR analytics ($\beta = 0.57$, $p = .009$) was a significant predictor, with the result that organizations that use HR analytics are likely to adopt the cloud HR solutions. In this regard, this fits into the bigger trend of data driven decision making increasing as an essential component of HR transformation.

Other main predictors are cost reduction ($\beta = 0.39$; $p = 0.003$), payroll automation ($\beta = 0.47$; $p = 0.006$) and employee engagement ($\beta = -0.31$; $p = 0.028$). A negative coefficient related to employee engagement implies that for organizations having lower levels of employee engagement, such cloud HR solutions is more likely to be to improve the workforce satisfaction and interaction.

Data security concerns ($\beta = 0.42$, $p = 0.002$) were also a strong predictor; that is, security considerations have an important influence in cloud HR decision making. The results also indicated that organization size ($p = 0.046$), workforce planning ($p = 0.041$) and compliance & regulation handling ($p = 0.027$) play a significant role in selecting cloud- based HR solution, implying that larger organizations and the organizations that focus on compliance will allocate more in cloud-based HR solution.

Table 14

Logistic Regression Results - Predicting Cloud HR Adoption

Independent Variable	Beta Coefficient (β)	Standard Error	Wald Chi-Square	p-value	Significance
HR Analytics Usage	0.57	0.14	6.71	0.009	Significant
Employee Engagement	-0.31	0.12	4.85	0.028	Significant
Data Security Concerns	0.42	0.10	9.22	0.002	Significant
Organization Size	0.26	0.11	3.99	0.046	Significant

Cloud HR System Usability	0.35	0.13	5.78	0.014	Significant
Workforce Planning	0.21	0.15	3.67	0.041	Significant
Compliance & Regulation Handling	-0.28	0.14	4.91	0.027	Significant
Payroll Automation	0.47	0.12	7.45	0.006	Significant
Performance Management	0.33	0.11	6.21	0.015	Significant
Cost Reduction	0.39	0.10	8.13	0.003	Significant
Talent Acquisition	0.45	0.09	7.89	0.008	Significant

Discussion and Conclusion

Discussion

The study findings show that cloud computing is strategically having an impact on HR transformation and is creeping in different HR functions and how organizations are challenged on its implementation (Jani, Muduli & Kishore, 2021). Results of the study are in accordance with existing literature in that cloud-based HR solutions help in improvement of operational efficiency, cost effectiveness and decision making based on data and at the same time have the challenge of security and integration.

One of most widely adopted cloud HR functions are payroll, recruitment, employee engagement and HR analytics (Ni, 2022; Abdussamad, et al., 2022; Alsharari, 2022; Junita, 2021; Jani, Muduli & Kishore, 2021) This grows in line with the growing demand of automation and Realtime analytics in workforce management. Likewise, adoption of HR analytics significantly improves HR efficiency as found in this study that cloud computing in HRM helps in decision making through AI driven insights. Organizations which have adopted cloud HR systems for longer stated advantages in relation to better efficiency, employee satisfaction and cost savings, results in line with previous research showing that ongoing cloud usage optimizes HR workflows and employee experience. The convergence of AI, block-chain, and machine learning into cloud HR systems is a major transformation in the way organizations manage their people. AI-powered analytics allow for predictive talent recruitment and real-time employee sentiment

analysis, while block-chain provides secure and transparent record-keeping. Machine learning algorithms provide customized insights into employee performance and engagement, further adding to the strategic value of cloud HR systems. These technologies not only solve existing problems like data security and integration but also open the door to more agile and innovative HR practices.

Benefits and Challenges of Cloud HR Adoption

The study showed that the reason for adoption of cloud HR is down to cost savings, scalability and enhanced employee experience. These findings are in line with previous research which mention that cloud-based HR solutions give organizations the option to do various things, smooth integration as well as financial benefits. Some possible drawbacks of implementing cloud HR are the challenges of data security, high implementation and employees' resistance to change. Prior studies have indicated that the cybersecurity risks and regulatory compliance are the main impediments that hinder cloud computing adoption in HRM (Ni, 2022; Abdussamad, et al., 2022; Jani, Muduli & Kishore, 2021). The results of chi-square test confirm that organizations with more complex mandates do not mean their cloud HR adoption rates are any higher, which indicates that regulatory complexity is an issue.

The findings confirm previously published research that the integration of cloud HR systems with other enterprise applications is a hard problem for organizations and does impact overall efficiency. Previous literature has indicated that the success of cloud HR transformation requires a strong IT infrastructure and cross functional collaboration to tackle integration.

The Long-Term Strategic Impact of Cloud HR Systems

Results of ANOVA from the study confirm that organization using cloud HR for more than three years have higher efficiency and employee satisfaction than the rest. This is in line with what previous research has suggested where it shows the cumulative effect of cloud HR solutions on organizations; it allows them to perfect their HR methods and invent in the long run (Shahi & Neloy, 2020). Logistic regression indicated that the HR analytics usage, cost reduction, payroll automation and security concern are the strongest predictors for cloud HR adoption. These results back up research that has shown that HR decision making enterprises focus on business intelligence mainly for decision making (datacenter) and financial efficiency (cost factor).

Studies on the organization of AI-based HR management highlight that when integrating cloud solution with machine learning features, it helps companies to streamline recruitment, workforce planning as well as employee engagement (Nachit, & Okar, 2020). These findings are validated by the regression results which indicate that adoption of cloud HR is determined mainly by the talent acquisition and performance management.

While cloud computing is a transformative tool in HR, wider organizational agility, automation trends and industry-based workforce strategies also contribute to organizations' adoption of the cloud (Vahdat, 2022; Sengupta, et al., 2021). According, the use of emerging technologies in the HRM play a crucial role in improving the workplace efficiencies and innovation the key role of the cloud HR in enhancing the HR processes concurs with this Vardarlier (2020). Ul Ayaz, (2021), also talks about how the VUCA (volatility, uncertainty, complexity and ambiguity) environments make agile HR strategies a compulsory tool to adopt and cloud HR adoption forms a necessary step for the organizations which strive for agility in the business environment that is inflexibly changing. The role of automation and workforce development in strategic HRM has been emphasized in the research, discussed in balancing automation and human resource development. Understanding the existing theories related to this perspective is relevant, because, as shown in this study, the challenges faced regarding employee's resistance to change is a barrier for the full transition to the cloud HR systems by such organizations.

investigates the challenges and trends in technology driven HRM and back up findings of this study that still exist such as security concerns and integration problems as barriers for the adoption of cloud HR, that HR functions must be developed through digital transformation, which support that HR practitioners or professional must be equipped with new digital skills in order to utilize cloud-based HR systems effectively (Vahdat, 2022; Sengupta, et al., 2021) (Jani, Muduli & Kishore, 2021; Barišić, Barišić, & Miloloža, 2021). This is consistent with concluding that complete sustainable digital transformation in a learning organization requires the joint use of cloud-based human resource management and continuous workforce training. indicate that the disruptive effect of cloud technologies on HR and entrepreneurship, which demonstrate the importance of cloud computing not only as an enabler of HR efficiency but also the creator of a strategic workforce innovation (Maqueira, et al., 2022).

Implications for HR Strategies and Future Research

From a strategic standpoint, the findings indicate that organizations should give more attention to data security, employees training and integration scrollbar of the cloud HR transformation for the implementation of a successful system. Past research about HR's leadership role in making digital transformation also emphasizes the role HR professionals must play in having digital skills in order to make the best out of cloud HR.

The future research should focus on the combination of cloud HR and AI driven HRM since probabilistic analytics, automation and adaptive learning technology are the upcoming trends which is going to influence the cloud HR behaviour in future. In the course of organizations amidst Industry 4.0 and future continuity, investigating the impact of blockchain and decentralized technologies on cloud HR security and compliance can be helpful (Ni, 2022; Abdussamad, et al., 2022; Alsharari, 2022; Junita, 2021; Jani, Muduli & Kishore, 2021).

Hussain, et al., (2022) stated that implementation of cloud HR solutions has enormous economic and productivity benefits to organizations. Cost-benefit analysis identifies that cloud HR applications save an organization money through automating redundant activities, streamlining payroll, and reducing on-site IT requirements (Rana & Tuba, 207). According to the Sarfraz, Raja and Malik (2022) Cloud HR applications also boost employee productivity by enabling real-time business analytics and decision-making tools to assist HR personnel in directing resources to strategic endeavors (Raja, Raju, & Raja, 2021). Compliance expenses are also minimized by automated reporting and compliance with regulatory mandates. These financial savings, along with enhanced workforce productivity, render cloud HR systems a worthwhile investment for organizations wanting to streamline their HR processes (Sarfraz, Raju, & Aksar, 2018).

Conclusion

The results of this research indicate that cloud computing greatly contributes to the transformation of human resource management (HRM) due to the improvement in the efficiency, cost effectiveness, employee engagement and decision making. The most widely adopted cloud HR functions include payroll management, talent acquisition, HR analytics and employee engagement, becoming more dependent on the automation and data insight in modern HR practices, the results reflect. Those organizations that have used the cloud HR system for a

longer period claim to have achieved efficiency, cost reduction and employee satisfaction at much increased levels, so that cloud adoption brings long term benefits in HRM.

While the benefits are obvious, the study also highlights challenges that organizations have to overcome to switch over to cloud HR solutions (Ni, 2022; Abdussamad, et al., 2022; Alsharari, 2022; Junita, 2021). Significant barriers to the adoption of QR codes for facilitating the exchange of business cards include data security concerns, high implementation costs, resistance to change and integration issues (Vahdat, 2022; Sengupta, et al., 2021). Though cloud HR systems improve compliance management and security frameworks in organizations, a number still resist switching to the cloud because of risk perceptions and complexities in merging the cloud HR solution with the existing enterprise systems Vahdat, 2022; Jani, Muduli & Kishore, 2021). The study concludes that optimal training, infrastructure enhancements and policy environments will be of high priority for a seamless adoption of cloud HR.

From a strategic point of view, these results emphasize that from the HR professionals' point of view, digital competence plays an important role in order to exploit cloud HR capabilities to the full. This indicates that organizations should invest in programs for workforce training where employees and HR teams gets better equipped with the understanding of cloud based tools and ensures that employees can work effectively in using these tools. While it's the HR department's responsibility to develop its own robust cybersecurity measures to guard against data privacy risk, it needs to work with IT teams to implement it.

The results of the regression analysis in this research show that the usage of HR analytics, cost reduction, payroll automation and data security issues are the strongest predictors in the cloud HR Adoption Vahdat, 2022; Sengupta, et al., 2021) (Barišić, Barišić, & Miloloža, 2021). This proves that organizations need efficiency, money savings and security when they decide to adopt cloud-based HR systems. AI driven HR transition is very much following the trend where the predictive analytics and automation are becoming the integral part of workforce management as per the study's findings.

As more businesses come to grips with the industry 4.0 revolution, future hopes for the adoption of cloud HR, in my opinion are highly likely to be influenced by the new wave of artificial intelligence, blockchain technology and machine learning. The application of these emerging technologies can improve cloud HR security, facilitate real time workforce analytics and monitor

the compliance processes besides perfecting HRM processes. Gaining better employee experience, enhancing talent acquisition, boosting strategic workforce planning for organizations that implement cloud HR solution and add more advanced AI driven decision-making models in it.

This study offers critical insights for HR leaders, policymakers and the business executive community trying to comprehend the effect that cloud HR transformation has on strategy. The findings indicate that organizations need to prioritize on putting in place the structured cloud adoption roadmaps that introduce cloud-based HR tools into the organization in steps more efficiently. Further research should investigate cloud HR adoption challenges that are industry specific such as industry specific compliance requirements, workforce dynamic and technology needs of an industry.

Future studies on how data analytics based on predictive HR technologies will facilitate workforce planning and decrease attrition in employee retention strategies is also required in the worldwide HR setup. Further examination of the probable effects of employee perceptions and experiences on the cloud HR adoption is required, as organizational culture and employee engagement are key determiners of the digital HR transformation success.

Based on this the role of the cloud computing in HRM is eliminating these problems and is reshaping it by giving a new innovative direction which has more efficiency, decision making and the workforce engagement. Although not without challenge organizations that identify and tackle security risks, invest in education for their workforce and integrate cloud HR adoption to their overall digital transformation strategy will be best equipped to take advantage of the complete capability of cloud HR. It is clear that, the future of HRM will be relying heavily on data, focused on agility and technology enabled; and cloud computing will continue to facilitate the strategic transformation and reengineering of HR.

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