REVIEW

Dovetailing the human resource management with the cloud computing in the era of industry 4.0: A review

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Abstract: The Current review evaluates the human side of Industrial Revolution which is blending the physical, biological, and digital worlds, erasing the borders between technology and human. The Current article examines the potential benefits of Cloud Computing (CC) in the area of HR, and their significant advantages in various HRM processes and highlights the development and trends in the industrial revolution. The 44 articles were retrieved from free search engines like Google scholar, Proquest, Research Gate and Google from (2010-2022). The articles selected through this process were carefully analyzed to synthesize existing knowledge. The findings emphasized that cloud based HRMS offers distinctive advantages to enhance efficiency and cost-effectiveness. The review surfaces that innovative programs have disrupted traditional HR management practices by transitioning the company's segregated in-house HRMS to the cloud. The organizations; implementing and practicing such technologies have gained competitive edge over their rivals. Additionally, cloud computing facilitates efficient resource utilization, seamless scalability, elimination of hardware and software maintenance requirements, and reliable data recovery capabilities. The study suggests strategies on how HR must create a digital workplace that can innovate, collaborate, and tackle business issues.

Keywords: human resource, HRM, industry 4.0, cloud computing

1 Introduction

In the realm of HRM, information technology (IT) preserves an essential and growing role [1]. Human Resources (HR) have transformed into an official and internal structure of organizations, serving as the governing body for all facets of HRM. Starting from Compensation, Recruitment, and incentives, work relationships, relations among employees, training of staff, and organizational development are all HR responsibilities [2]. The advent of the information system in HR and electronic HRM resulted from the expansion of human resources' role and the advancement of technology [3]. According to [4], e-HRM refers to the utilization of web-based technology for the implementation of HRM policies, strategies, and practices within a company [4]. The information systems of HR are the technical tools that are there for gathering, storing, maintaining, and retrieving the data of an organization's employees are known as human resource information systems [5]. It can assist firms in managing people and fostering a culture of creativity [6]. Cloud computing technology enables HR managers to focus on more strategic thinking tasks such as supporting innovation, by streamlining functional and service-delivery responsibilities [7].

The shift of physical labor to machines and the growing significance of mental abilities have also reshaped the workforce in terms of its skill requirements and composition. Human Resource Management (HRM) has begun to incorporate these new technologies and we are witnessing a digital boom, which is radically transforming our work environment and reshaping our perception of HR. This surge in digital advancements brings forth the potential for innovative HR technology solutions [8].

Traditional Human Resource rules are being influenced by the current generation of technology. With new creative technologies, the HR industry is rapidly evolving. These types of departments of an organization are progressively abandoning traditional techniques in favor of emerging Cutting-edge technologies like Cloud Computing and Artificial Intelligence (AI) 2

(Cloud Computing, 2013). From hiring through onboarding, training, and other advantages, these technological solutions have changed the recruitment process by automating and streamlining the process. Technology now plays a very important role in increasing the functions of an administrative HR department globally.

According to Ghosh (2020) of Elets News Network (ENN), cloud computing plays a crucial role in driving the Industrial Revolution 4.0. It supports advancements in internet of things (IoT), automation, and robotics, enabling more efficient processes in the banking and financial industry to stay competitive. Cloud computing is a scalable platform that allows non-technical people to easily manage and access hardware and software through a web application via the internet [9]. Industries or organizations of all sizes get the advantages of IoT and more importantly, it had a significant and favorable impact on big to small-sized organizations [10]. The new software's capacity to maintain talent management effectively and high-quality, enhance performance and achieve all of this while remaining cost-effective was the driving force behind the current technological solutions.

It is evident from Figure 1 that due to technological improvements, from the 1970s to the 1990s cloud computing evolved at breakneck speed. International Business Machines (IBM) company then released the Virtual Machine operating system in 1972 [11]. Telecommunications firms began selling Virtual Private Networks as rented services in the 1990s. In 1997, Professor Ramnath Chellapa introduced Cloud computing and sooner the cloud gained so much popularity in business and in 1999, Sales force Company emerged as a shining example of cloud computing success adoption.
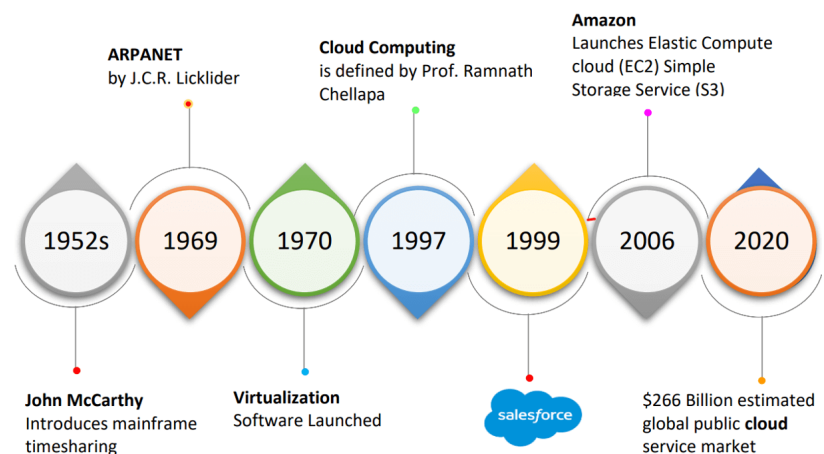
Figure 1   Cloud computing road map (Source: Developed by the authors in line with the literature review)

With the advancements in HR automation, HR professionals now view themselves less as administrators and more as strategic elements in important organizational choices and human resources departments are seen more as online resources than actual people. Moreover, HRM may undergo a radical and an unimaginable transformation, owing to the widespread availability of human resource services provided by most companies via technical and web-based applications [12]. These shifts are typically brought about by the necessity to cut expenses while simultaneously increasing service quality. In the extant literature, some studies have identified the factors that cause firms to embrace Cloud Computing [13, 14]. However, there is a dearth of in-depth research regarding factors that impact the uptake of Cloud Computing by organizations. Thus, the current study reviews and synthesis the possible benefits of Cloud Computing (CC) in the field of human resources, as well as their substantial advantages in different HRM activities, and highlights developments and trends in the industrial revolution.

Going ahead, a review of literature is conducted on prior studies to understand the impact, challenges, and countermeasures. There are primarily five sections to this article. The first part is an introduction where a brief overview of the topic and the justifications for the study are laid out followed by an introduction to Human Resource Management in the second section. Industry revolution and why Cloud Computing matters in Human resources are discussed in section three, followed by a concise summary of CC Architecture in the subsequent section. The fifth part presents some of the prior research studies in the field and the findings and discussion of the research on the adoption of CC by organizations is discussed and final part is conclusion. (see Figure 2)
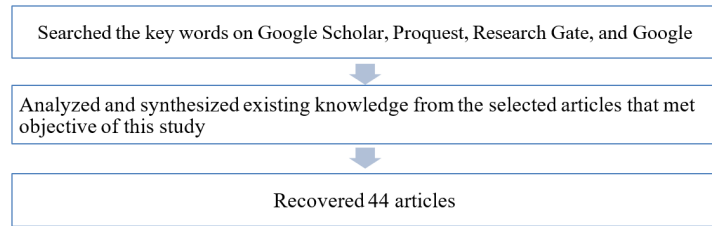
Figure 2   The methodology adopted for the study

2   Human Resource Management (HRM)

According to Flippo and Munsinger (1982), HRM is "the process of planning, directing, organizing and controlling the acquisition, compensation, integration, maintenance, development, and separation of human resources to the end that individual, organizational and social objectives are achieved." Human Resources (Human Capital) are essential for the success of any company. Human resources allow an organization to foster the growth and development of its employees through the sharing of valuable personnel knowledge, skills, and experience. The use of Cloud Computing (CC) holds considerable importance and benefits in terms of business performance. Organizations can improve their cloud computing adoption through agility and culture. Expert cloud has a substantial influence on and direct relationship with HRs because it eases communication among HRs while also lowering service costs [15]. The shift of HRM to the "cloud" represents a novel and advanced approach that can enable enterprises to attain notable cost savings. In the realm of cloud computing, HRM systems provide a competitive edge [16].

Small and mid-size factories face challenges in upgrading their IT infrastructure efficiently due to limited resources, such as financial and human capital, which are comparatively lesser than those available to large-size factories. Consequently, this lack of adequate resources may hinder their competitiveness when competing in a business environment against more powerful competitors [17]. While cloud computing applications offer benefits to companies to survive in a competitive environment. To attain business agility, the majority of organizations employ various Information and Communication Technology (ICT) tools, including Management Information Systems (MIS), Decision Support Systems (DSS), Business Intelligence (BI), Knowledge Management (KM), and web collaboration. Furthermore, this could lead to a significant rise in energy consumption, thus, raising significant environmental concerns. Cloud computing presents an ideal and cost-effective solution to address these issues and offering a platform for sustainable business practices that contribute to increase profits, a healthier environment, and improve HRM [18].

The management of human resources involves the application of contemporary science, technology, and HRM theories to accomplish the strategic objectives of an organization.

This process entails acquiring human capital from society and subsequently adapting, integrating, and developing the existing human resources. The Human Resource Management System (HRMS) encompasses a diverse array of elements, including the management of personnel information, employee recruitment, performance appraisal, attendance management, salary management, and more [19]. (see Figure 3)
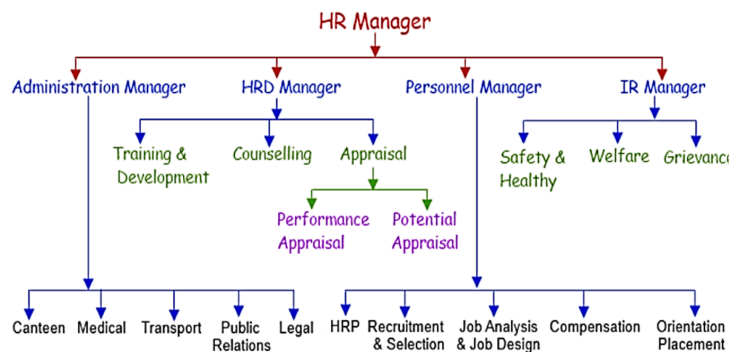

Figure 3   Human Resource Management Activities and Processes

3 Industry revolution and why cloud computing matters in HR

The First Industrial Revolution saw the adoption of water and steam power for the mechanization of production and then electricity became instrumental in the Second Industrial Revolution, enabling mass production of goods [20]. The Third Revolution witnessed the introduction of electronics and computer technologies, which played a pivotal role in automating production processes [20]. The fourth Industrial Revolution, commonly referred to as the digital revolution, is currently unfolding [20]. It is characterized by the convergence of various technologies that blur the lines between the physical, digital, and biological domains. These phases are known as the term 1.0, 2.0, 3.0, and 4.0 respectively and Figure 4 describe a brief idea of industrial revolutions over time.
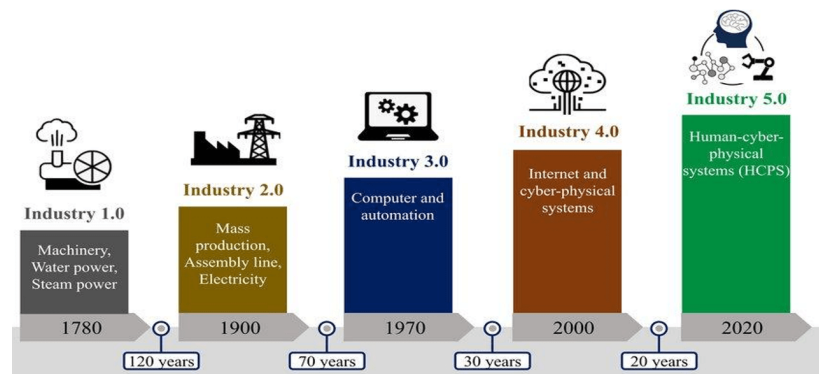

Figure 4   The roadmap of Industrial Revolution [20]

The industrial landscape has undergone a series of transformations since the first industrial revolution, with each stage marked by significant technological advancements. Figure 4 provides a visual representation of the industrial evolution from the first revolution to the current fourth industrial revolution. It illustrates the different eras of industrial development and the key innovations that have shaped each phase.

3.1 Industry revolution

The fourth revolution is progressing at an exponential rate as compared to the earlier industrial revolution and today's changes are notable for three factors: scope, system impact, and velocity. Furthermore, it is now touching nearly every industry's entire system from management start to production and governance across the globe. HR professionals nowadays are responsible for a variety of tasks such as recruiting new employees, payroll, employee relations management, strategy development, and many more [8]. The HR Department lacks the capacity to handle all the manual, paper-based processes alongside its existing responsibilities. Auspiciously, the advent of the digital revolution has brought about a transformation in the way we live and work. HR professionals' duties also have been transformed, allowing them to focus on organizational reform and growth rather than the day-to-day administrative weight of paper works.

3.2 Major reasons why cloud computing matters in HR

This transition began in the recent years 2020 and 2021, as firms increased their digital transformation initiatives in response to the epidemic. Throughout COVID-19 pandemic, companies learned how critical it was to have access to their applications, data, and computing resources, not just within the office but from anywhere their employees worked. (see Table 1)

The Current Industrial Revolution is blending the physical, biological, and digital worlds, erasing the borders between technology and humans. The effects of these technological shifts on how people work, and organizations create value will span all sorts of business. Organizations of all sizes and the department of Human Resources, in particular, will need to adjust to these developments while also assisting with workforce transformation. Exploring the three tiers of cloud service delivery models will reveal the capabilities and benefits these technologies may provide to your business. Use them to respond more quickly to changing client demands.

The integration of Human Resource management and Cloud Computing have a profound impact on employees, organizations and societies in terms of living styles, job patterns, company's

Table 1   Old HRM vs new HRM in the current technology era [21]

SN	Old HR Goals and Objectives	New HR Goals and Objectives
1	To establish standardized HR practices, he HR department directs its attention towards process design and harmonization	Employers' teamwork, productivity, engagement, and career progression are all priorities for HR departments.
2	To attain scalability, HR chooses a cloud-based, the HR department selects a cloud-based vendor and applies out-of-the-box procedures.	HR creates unique, company-specific programs and scales them using the platform.
3	The HR center of excellence places emphasis on process design and striving for process excellence.	At the HR center, there is a strong focus on prioritizing excellence through the utilization of innovative technologies such as Artificial Intelligence (AI), chatbots, apps, and other cutting-edge advancements.
4	HR highlights self-service as a strategy for scaling services effectively.	HR places its focus on enabling to assist employees in completing tasks more efficiently.
5	HR programs are built for global scalability and consistency.	HR programs are tailored to certain segments, personae, and groups of employees.

organizational structures, and how they are carried out. Cloud computing allows organizations, especially Small and Medium Business (SMBs), to innovate and enhance their electronic HR procedures. Cloud computing in a private, dedicated, or solo environment will boost productivity and security [10]. Digital Technology has an impact on all parts of Human Resource Management [17].

According to a report by Market Research Future (IDC, 2022), the forecast for cloud deployment in enterprise infrastructure spending is set to rise significantly between 2020-2025. The report indicates that buyers of enterprise infrastructure are increasingly investing in cloud deployment. To be more precise, the report predicts Compound annual growth rate (CAGR) of the global cloud infrastructure market 11.4% from 2016's value of $19.10 billion to reach $50.73 billion by 2025 as shown in Figure 5.
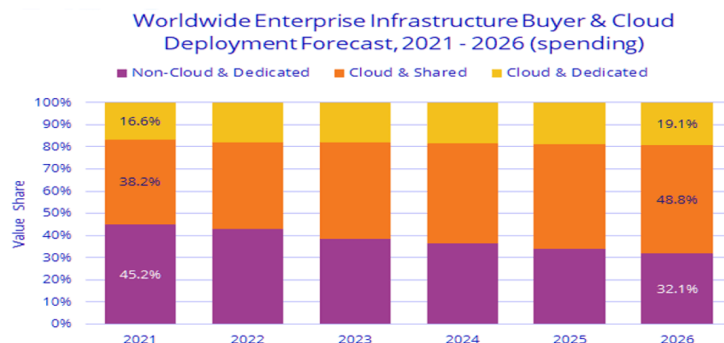
Figure 5   Buyers of Enterprise Infrastructure and Forecast of Cloud Deployment in the World, within 2020-25 Spending (Worldwide Quarterly Enterprise Infrastructure (IDC, 2022)

This represents a substantial shift towards cloud adoption, as businesses realize the benefits of flexibility, scalability, and cost-effectiveness offered by cloud-based infrastructure. Therefore, it is clear that there is a growing trend among enterprise infrastructure buyers towards cloud deployment, with significant growth expected in this area over the coming years.

4   A comprehensive look at cloud computing: Unveiling the key aspects

Cloud computing encompasses a range of internet-based services, such as servers, databases, storage, networking, software, intelligence, and analytics, that are provided to users. The infrastructure and its maintenance are the responsibility of a cloud vendor. Cloud computing, from the standpoint of technological advancement, serves as an integrated solution that enables users to effectively manage extensive network resources, leveraging various technological advancements. Within the purview of cloud computing, the three primary service categories include Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) [22]. From a targeted marketing standpoint, Cloud computing may be categorized based on the users. Public cloud, private cloud, and community cloud are examples of cloud types [23].

Figure 6 shows the different service models of cloud computing with their examples. CC is an emerging field and has been identified with its major characteristics [22]:

(1) PAY-AS-YOU-GO: Cloud computing operates on a pay-as-you-go model where users only pay for the platform or services they utilize, ensuring efficient resource allocation without any wastage. Manufacturing or service resources are distributed based on the specific demands of the users [24].

(2) SHARING: Cloud computing solutions enable anyone, anytime from anywhere to access, interchange, and sharing of data. Cloud computing, in contrast to traditional information technologies, encourages collaboration and the sharing of computing resources between businesses. Cloud computing solutions enable anyone, anytime from anywhere to access, interchange, and sharing of data. Cloud computing, in contrast to traditional information technologies, encourages collaboration and the sharing of computing resources between businesses [22].

(3) FLEXIBILITY: Employing a type of personal assistant devices or computing terminals, consumers can request services and acquire computing resources from anywhere they are located and at any time [22].

(4) LOW COST: Larger corporations be able to create the systems they rely on, which are based on cloud and make extensive use of them to reduce the cost of their information systems [22]. For enterprises, systems produced by foremost IT providers such as IBM, Amazon, Google, and Microsoft are available.
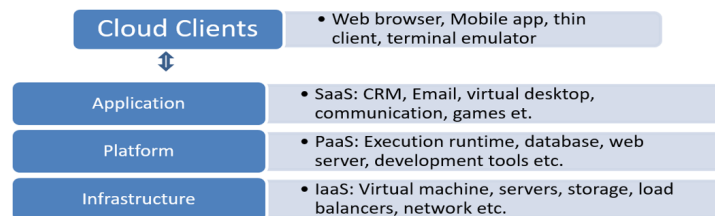

Figure 6   Cloud service delivery models

The different cloud service delivery models are depicted in Figure 1. The figure shows the three primary cloud service delivery models along with their respective characteristics and examples such as:

(1) Software-as-a-Service (SaaS);
(2) Platform-as-a-Service (PaaS);
(3) And Infrastructure-as-a-Service (IaaS)

# 5   Prior research studies of cloud towards HRM

Because of the popularity of this revolutionary technology, the market for cloud technology is experiencing a rapid growth and is considered one of the fastest-growing sectors in this century. Market demands push enterprises of all sizes to use cloud computing solutions to benefit from cloud services and their advantages such as flexibility, user-friendly, scalability, and availability [25]. The conventional approaches emphasized that HR has placed on talent management, procedure, and transactional work is giving way to a broader mandate. Human resources are increasingly taking on the role of innovative consultants with expanded responsibilities, including the design, simplification, and enhancement of the whole employee and applicant experience.

This section focuses on some cloud-based HRM adoption by the organization, as well as the benefits and obstacles of implementing such emerging technologies. Enterprise Human Resource Management System (HRMS) model is presented by using Cloud Technology to handle HR difficulties in this sector [25]. The proposed model is made up of sixteen basic modules that are commonly found in well-known HRM systems. The system was created utilizing a variety of technologies, including the Code Igniter software framework, and was launched and deployed in the Elastic Compute (EC2) of Amazon Web Services (AWS). With the increased need and complexity of producing online services and based on an examination of HRM and information System (IS) needs for multiple organizations, to make web services more user-friendly, stretchy, inexpensive, and adaptable.

To make the organization more flexible and expandable, a distinct approach for HRM was proposed utilizing cloud technology. The proposed approach provides four key services -HRM, HRM-Web, Management Configuration, and agent service in the cloud-based portal. When an

agent uses HRM Web Service to request services, the data is submitted, and HRM Web Service responds to the request. The data is then sent to the database via Web-Port, where the required data is saved. Then via Web-Port data is collected from the database, which is in the cloud, while HRM-Web executes the implementation to build a report that is conveyed by the user, as shown in Figure 7. The configuration manager is used for monitoring many of the services of cloud storage.
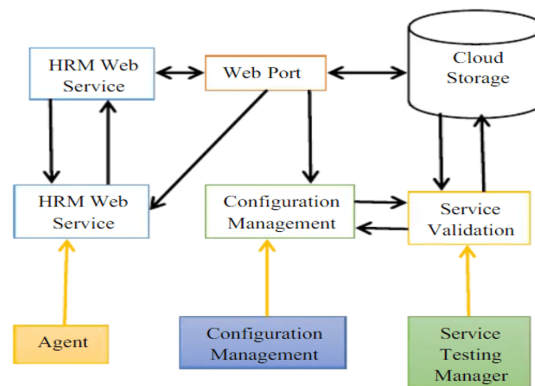

Figure 7   Cloud-based HRM model

HRM framework is based on the cloud to deliver effective HRM solutions for businesses; it also allows users to do various HR tasks in a simple and user-friendly manner [8]. Salary and Personal Information Management, Leave, Benefits, Employee Self Services, and other modules are included in the proposed framework. Which also allows the users to perform various HR actions by providing a user-friendly interface. If the user chooses the Salary section, for example, all payroll issues will be addressed.

In their study, Wang et al. (2016) [22] focused on the utilization of cloud-based solutions in small and medium businesses (SMEs). By leveraging these solutions, organizations can efficiently share computing resources and incorporate advanced functionalities, such as on-demand payments, into the HRM sub-system. The proposed model not only enhances the performance of traditional HRM activities but also increases system flexibility to handle uncertainties and changes while standardizing HRM procedures. Figure 7 shows the proposed model diagram of the paper.

Using Cloud Computing (CC) for HR management is an ambitious attempt to apply cross-disciplinary technologies to the field [26]. This article presents the architecture for a rural HRM platform built on the IoT and cloud computing. Organizational structure and planning, employee compensation and benefits, hiring and onboarding, evaluation of job performance, induction and training, employee self-service, rules and regulations, administration of employment agreements, and system administration are all key components of this system's design. The system function well, by facilitating extensive collaboration and using CC Integration, collaborative management, and distributed computing. These elements enable seamless integration and processing of data from multiple sources, meeting the demands of HRIM (Human Resource Information Management) managers. The authors further stated the application sectors for CC and big data analysis and processing are rising. The future studies should focus on improving existing approaches to managing big data in HR.

Making use of cloud computing's enormous size, versatility, scalability, and high reliability, HR archive-DSS is constructed in this research for use in a variety of management and decision-making tasks [7]. The system's design is grounded in an examination of the benefits of CC in areas such as resource sharing and integration, and it is built upon a multi-layer architecture consisting of data acquisition, cloud computing support, network service support, system application, data standardization conversion system layer, decision support, and others. The solution addresses the limitations of traditional archive management, which include insufficient data resources, the inability to attain Isomorphy, and the challenge of processing data uniformly from various data bases. (see Figure 8)

Avram (2014) [27] studies the benefits and the challenges of cloud-based solution adoption from the standpoint of the enterprises; the analysis was based on aspects that an enterprise must consider when deciding to use the cloud. Cost, performance, security, and most important the integration of existing IT infrastructure with the cloud are all aspects to consider. According to the study, the business should be the first to adopt the cloud because their procedures are much
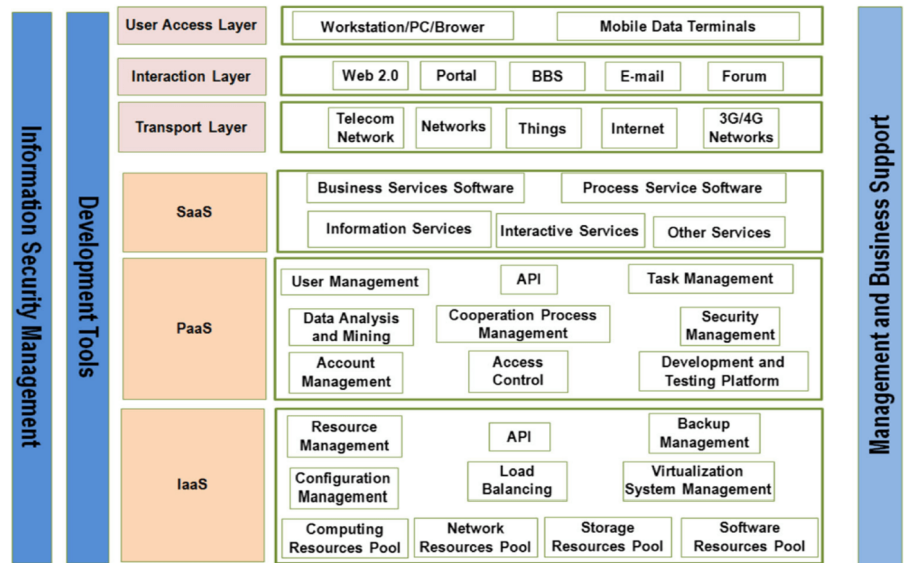
Figure 8   Human Resource information system for Small and medium-sized enterprises

easier than those of large corporations. It is also pertinent to mention that some companies would refrain from using the cloud because of putting their sensitive data off-premises.

6   Discussion

An outstanding blend of on-premises and cloud infrastructures is the true essence of cloud computing. A hybrid platform may be built on top of it, making it easier for companies to grow and diversify their revenue streams. In terms of functionality and adaptability, today's cloud-based solutions are unmatched. For organizations of any size or industry, it helps them satisfy their infrastructure, software, and hardware needs. The cloud based HRM solutions can help with the transition from office administration to different procedure management. But with limited IT capabilities, human resources managers face a hurdle [28]. Human resource managers should have a greater understanding of management tools and IT skills. In this cloud era, human resources managers should be able to do the following:

Firstly, cloud strategy's capability. Managers, who serve as implementers of strategies, are required not only to offer strategic support to businesses but also to acquire the skills to effectively position businesses and actively contribute to the formulation of their strategies.

Secondly, the ability to coordinate cloud resources. Because HRM will eventually be divided as firms grow in size, managers should keep a coordinative role such as managing the connection between superiors and lower-level employees, as well as all departments and newly hired staff even though if they do not possess formal authority or permission to do so.

Thirdly, the capability of cloud learning. The utilization of cloud technologies in HRM represents a crucial learning point that managers should acknowledge, as it enhances the ability of cloud-based learning, making it the third important aspect to consider. They must develop expertise in cloud administration [29]. Fourthly, the key aspect is proficiency in cloud consulting. Managers need to cultivate their consulting skills in order to deliver tutoring and consulting services related to cloud management, which are sought after by businesses, whenever required. They should support businesses in acquiring expertise in cloud management theory, methodologies, and capabilities. This enables them to become effective communicators who can facilitate the widespread adoption of cloud technology within organizations. (see Table 2)

Given the crucial role of HR in the organization's dedication to working well and efficiently, with tools and data to make the accurate decisions and show value, the study's findings indicated an intention to embrace cloud human resources management. The most dynamic persons in the senior workforce today are HR professionals. They may significantly contribute to setting up and sustaining a productive workplace by learning more about the cloud and digital technologies by employing HR management tools in the cloud. To line up with the company, HR needs to modernize and adapt. Meanwhile, this is also important to manage all HR activities and expand their usage of cloud-based services, HR must select the best HR system in the cloud. Therefore,

Table 2   Numerous studies have explored HRM in relation to the integration of cloud computing technology

Reference	Title	Aims
(Abdullah et al., 2020)	An HRM system for small and Medium enterprises Based on cloud computing technology	The usage of Cloud Technology has been proposed and applied to tackle the HR issues in this area using an EHRMS paradigm.
(Nandan et al., 2014)	Advancement of human Resource Management with Cloud Computing	This research proposed cloud based HRM. The suggested system employs Cloud-based HRM to allow users to access resources based on established criteria. The suggested architecture dynamically picks a computing resource by a service request to make HR more efficient using the Cloud. This helps us manage complex and strategic corporate operations.
(Datta et al., 2012)	Cloud Computing: A Solution to Human Resource Management System	This study aims to design a cloud based HRM application that enables a company the make use of cloud HR Management web service to provide cost-effective HR solutions and gain economic benefits.
(Wang et al., 2016b)	Cloud computing in HRM systems for small and medium enterprises	The author suggests employing cloud computing in the sharing of computing resources and facilitating advanced features, such as on-demand payments, within the human resource management subsystem. The focus of this proposal centers on applications tailored for small and medium enterprises.
(Chai, 2022a)	Design of Rural Human Resource Management Platform Integrating IoT and Cloud Computing	A design scheme for a rural HRM platform built on the IoT and cloud computing. Organizational structure and planning, employee compensation and benefits, hiring and onboarding, evaluation of job performance, induction and training, employee self-service, rules and regulations, administration of employment agreements, and system administration.
(Cai & Chen, 2021a)	Optimization of HR File Information Decision Support System Based on CC	An HR archive-DSS is constructed in this research for use in a variety of management and decision-making tasks. The solution addresses the limitations of conventional archive management, including insufficient data resources, the inability to achieve isomorphism, and the challenge of processing data uniformly from various data sources.
(Avram, 2014)	Advantages and challenges of adopting CC from an enterprise perspective	This article examines the factors that businesses should consider when making a decision about adopting cloud computing, focusing on the business perspective. It evaluates the advantages and disadvantages of various aspects, including integration with existing IT infrastructure and software, costs, return on investment, performance, and security. Furthermore, it explores how these factors are influenced by the company's size and industry, aiming to determine the most suitable type of cloud computing solution for each specific business.

when cloud computing is integrated with the company's HRM system, the cost of managing HR is reduced, the effectiveness of managing resources is increased [7], and the company's size and capital constraints are removed.

7   Conclusion

Cloud computing has progressed dramatically in recent years. Digital technologies link the globe today. This changed cloud computing's scope. Cloud computing's future breadth requires more employment, technology, and research funding. So many cloud computing trends are astounding. This article makes a substantial contribution to the field in understanding of Cloud computing (CC) and HRM integration, along with increasing the efficiency and effectiveness of HRM functions, industry revolution 4.0, and the adoption of CC in HRM. Human resource departments may already benefit from cloud computing, which is already fulfilling its promise of making them more dynamic and effective. HR management is no longer administrative. Disruptive forces have transformed how firms are operated, and HR must adapt. HR must create a digital workplace that can innovate, collaborate, and tackle business issues. We are already seeing the effects of cloud computing on HR. Hence, cloud based Human Resource Management System (HRMS) offers distinct advantages such as enhanced efficiency and cost-effectiveness. This innovative program disrupts traditional HR management practices by transitioning the company's segregated in-house HRMS to the cloud. Organizations that adopt this technology gain a competitive edge over their rivals. Additionally, cloud computing provides further benefits, including efficient resource utilization, seamless scalability, elimination of hardware and software maintenance requirements, and reliable data recovery capabilities.

8   Future research agenda

Impact of cloud-based HRMS on employee productivity and performance: Further research can investigate the direct impact of cloud-based HRMS on employee productivity, performance,

and job satisfaction. This can help organizations understand the specific mechanisms through which cloud technology influences employee outcomes.

Adoption and change management in transitioning to cloud-based HRMS: Future studies can focus on the challenges and strategies involved in the adoption and successful implementation of cloud-based HRMS. This can include examining change management practices, employee training and support, and overcoming resistance to technological changes.

Security and privacy considerations in cloud-based HRMS: Given the sensitive nature of HR data, it is important to explore the security and privacy implications of using cloud-based HRMS. Research can delve into issues such as data protection, encryption, access control, and compliance with relevant regulations.

Organizational culture and readiness for cloud-based HRMS: Investigating the organizational culture and readiness for adopting cloud-based HRMS can provide insights into the factors that influence the successful integration of technology. This can involve examining factors such as leadership support, organizational climate, and employee attitudes towards technological change.

Long-term impact and sustainability of cloud-based HRMS: Future research can explore the long-term effects and sustainability of adopting cloud-based HRMS. This can include assessing the scalability, flexibility, and long-term cost-effectiveness of cloud technology in HR management.

International collaborations and migration: Researches can be advanced in the field of cloud which can be studied as a facilitator for cross-border cooperation and remote work. Skilled professionals may collaborate on projects, exchange resources, and contribute to teams in other locations without physically migrating. This has ramifications for both the phenomena of brain drain/gain and the worldwide spread of expertise and creativity [30].

Overall, these research areas can contribute to a deeper understanding of the integration of cloud computing and human resource management and guide organizations in maximizing the benefits of cloud-based HRMS while addressing potential challenges.

9   Practical implications

The current article prioritize the value of cloud computing in HRM integration and embraces the transformative potential of cloud computing in the context of industry revolution 4.0. It also surfaces the shift from administrative to strategic HR management, leveraging the cloud-based technologies and foster a digital workplace that promotes innovation, collaboration, and agility. The study unveils the competitive advantage by adoption of cloud-based HRMS and Leverages additional benefits of cloud computing, such as resource utilization and data recovery. It is highly recommended for the organizations to embrace cloud computing, adapt to the digital era, and optimize HR practices to drive innovation and gain a competitive edge.

10   Limitations

This paper reviews relevant literature in line with our study's objective. The purpose of a literature review is to provide contextual information on a specific topic. As such, the methodology is not exhaustive but aims to offer an overview and introduction to the subject. This is achieved by evaluating existing research, theories, and evidence, and critically discussing and evaluating the content. It is important to note that this study may have limitations, such as potentially missing papers from different paid databases, as we conducted our search on Google and Google Scholar and others, selecting the latest and most relevant articles for this article.

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