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RESEARCH ARTICLE

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THE IMPACT OF CLOUD-BASED MANAGEMENT INFORMATION SYSTEMS ON HRM EFFICIENCY: AN ANALYSIS OF SMALL AND MEDIUM-SIZED ENTERPRISES (SMEs)

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ABSTRACT

Cloud-based management information systems (MIS) are becoming integral to the operational success of small and medium-sized enterprises (SMEs), particularly in enhancing the efficiency of human resource management (HRM) processes. This article, based on a comprehensive review of 75 peer-reviewed studies, investigates how the adoption of cloud-based MIS positively impacts critical HRM functions such as employee management, recruitment, training, and performance monitoring. The findings indicate that cloud-based systems significantly streamline these HR tasks by reducing time, costs, and the administrative burdens traditionally associated with manual or localized HR operations. Moreover, the integration of real-time data analytics through cloud-based platforms enhances decision-making capabilities, enabling HR professionals to make data-driven and timely decisions that improve overall workforce management. The reviewed studies also emphasize that cloud-based MIS are essential for improving strategic HR planning. These systems allow SMEs to access advanced tools for workforce analytics, employee engagement, and performance tracking, which were previously only accessible to larger corporations. The flexibility and scalability offered by cloud-based MIS enable SMEs to quickly adapt to changes in staffing needs, business growth, and external market conditions without the need for costly infrastructure. Furthermore, the review highlights the role of cloud technology in fostering innovation within HR departments by supporting predictive analytics and AI-driven decision-making, which can further enhance operational efficiency. In addition to operational benefits, cloud-based MIS facilitate a more seamless integration of HR functions across geographically dispersed teams, allowing for enhanced collaboration and communication. This capability is especially critical as SMEs continue to adopt remote and hybrid work models.

KEYWORDS

Cloud-Based Management Information Systems, Human Resource Management, Efficiency, SMEs, Employee Management, Recruitment, Performance Monitoring, Decision-Making, Data Analytics

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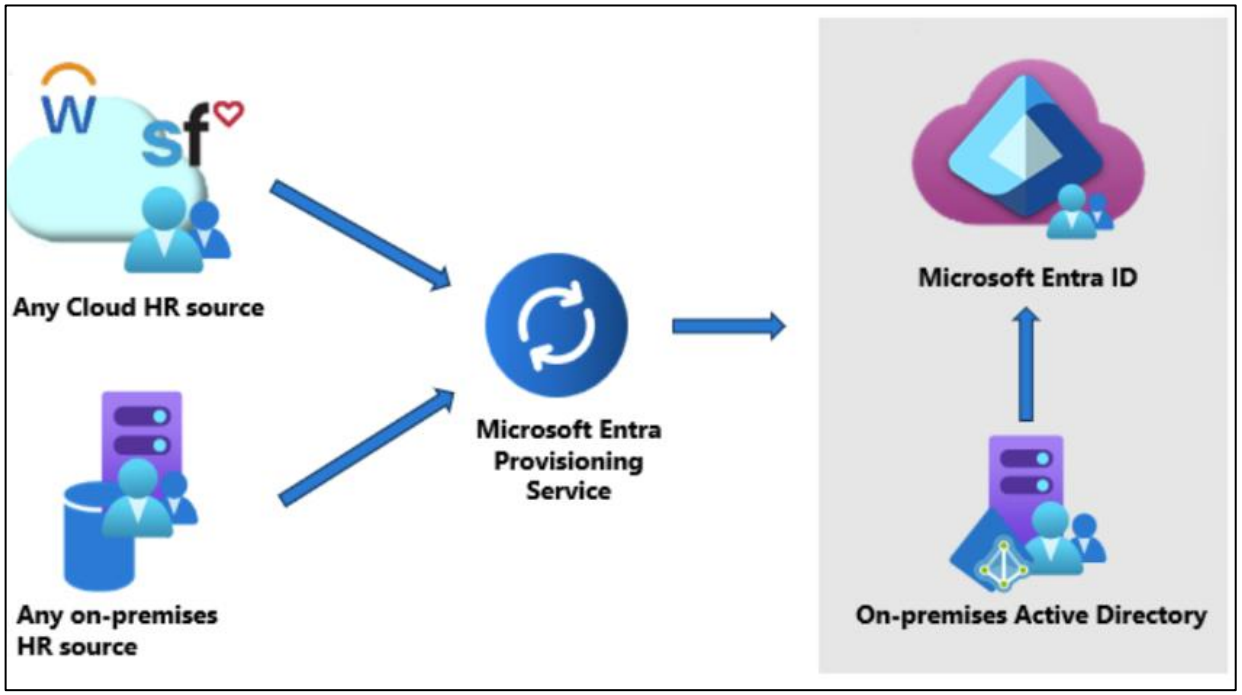
1 Introduction

The adoption of cloud-based management information systems (MIS) in human resource management (HRM) has garnered significant attention due to the increasing demand for efficient and cost-effective operations, especially within small and medium-sized enterprises (SMEs) (Khayer et al., 2020). As SMEs face unique challenges such as limited financial and human resources, they often lag behind larger enterprises in technological advancements (Al-Okaily et al., 2022). However, cloud-based MIS provide a solution by offering scalability and flexibility at a lower cost, enabling SMEs to streamline their HRM processes and improve overall operational efficiency (Alshira'h et al., 2020). The digital transformation in HRM, facilitated by cloud technology, allows SMEs to access features that were previously available only to larger corporations, such as data-driven decision-making tools, real-time analytics, and remote workforce management capabilities (Brender & Markov, 2013).

Cloud-based MIS enable HR departments to perform essential functions such as payroll management, recruitment, performance tracking, and employee training with greater accuracy and less manual intervention (Jabraeil Jamali et al., 2020). These systems reduce the administrative burden associated with traditional HR practices, allowing HR professionals to focus on more strategic tasks such as talent management and employee engagement (D'Ambra et al., 2012). The automation of routine tasks through cloud-based platforms results in improved operational efficiency and reduces human error, which is especially beneficial for SMEs where HR teams are often small and stretched across multiple functions (Okic et al., 2021). Additionally, the integration of artificial intelligence (AI) and machine learning capabilities within cloud-based systems further enhances their potential by enabling predictive analytics for workforce planning and recruitment (Nieuwenhuis et al., 2018).

The flexibility offered by cloud-based MIS is particularly important for SMEs, as it allows them to scale their HR operations according to their growth and evolving business needs (Misra et al., 2009). SMEs often experience fluctuations in staffing requirements, especially during periods of rapid growth or economic uncertainty. Cloud-based solutions provide the agility to adjust HR processes quickly, without the need for costly infrastructure investments (Cleary & Quinn, 2016). For instance, cloud-based recruitment platforms allow SMEs to access a global talent pool, enabling remote hiring and flexible working arrangements, which have

Figure 1: HR System Integration with Microsoft Entra Provisioning Service



Source: Bradley (2023)

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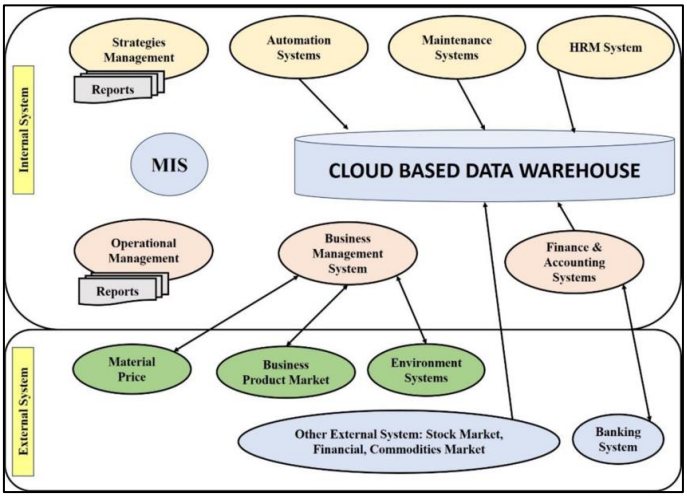
become increasingly common in today's globalized and post-pandemic work environment (DeLone & McLean, 2016). As SMEs continue to evolve, the adoption of cloud-based HRM systems supports their ability to remain competitive in a dynamic market (Paquette et al., 2010).

Despite these advantages, SMEs face several challenges in the implementation of cloud-based MIS, particularly in terms of data security and privacy (Singh et al., 2020). While cloud providers typically offer robust security protocols, the reliance on third-party vendors can raise concerns over data breaches and compliance with local regulations (Paquette et al., 2010). SMEs, which often lack the resources for specialized IT personnel, may find it difficult to fully assess the

Figure 2: Cloud-Based Data Warehouse Integration for HR and Business Systems



security measures provided by cloud vendors, leading to vulnerabilities in their HRM systems (Wu et al., 2018). Furthermore, resistance to change among employees and management can impede the successful implementation of cloud-based MIS. Organizational culture plays a critical role in the adoption of new technologies, and SMEs must invest in change management strategies to ensure smooth transitions (Chan et al., 2015). Moreover, the literature highlights the need for tailored approaches to cloud-based MIS adoption in SMEs, given their distinct characteristics compared to larger enterprises (Dinev et al., 2013). The success of cloud-based HRM systems in SMEs is often influenced by factors such as leadership support, IT infrastructure, and employee readiness for digital transformation (Alkhwaldi et al., 2019). Studies show that SMEs with a proactive approach to technological adoption, coupled with strong leadership, tend to achieve greater improvements in HRM efficiency compared to those that are hesitant or reactive in their technology adoption strategies (Alshira'h et al., 2020). Therefore, while cloud-based MIS offer substantial benefits to HRM in SMEs, their successful implementation requires careful consideration of both technological and organizational factors (Harney & Collings, 2021).

The primary objective of this study is to examine the impact of cloud-based management information systems (MIS) on human resource management (HRM) efficiency within small and medium-sized enterprises (SMEs). Specifically, the research aims to identify how cloud-based systems contribute to streamlining HR processes such as recruitment, payroll, performance evaluation, and employee training, while also exploring the cost-effectiveness and scalability of these technologies for resource-constrained SMEs. Additionally, the study seeks to analyze how the adoption of cloud-based MIS enhances decision-making capabilities through real-time data analytics and automation, leading to improved organizational performance. By investigating both the benefits and challenges of implementing cloud-based MIS in HRM, this research intends to provide a comprehensive understanding of the technological factors that drive HRM efficiency in SMEs. This will be achieved through a mixed-methods approach, combining qualitative interviews and quantitative survey data, to deliver actionable insights for both practitioners and researchers in the field of HR technology.

2 Literature Review

The implementation of cloud-based management information systems (MIS) in human resource management (HRM) has become increasingly important for small and medium-sized enterprises (SMEs) seeking to enhance operational efficiency and competitiveness. The literature on cloud-based MIS highlights their potential to transform traditional HRM practices by automating administrative tasks, improving data management, and enabling more informed decision-making. Several studies have explored the

technological, organizational, and strategic implications of adopting cloud-based MIS in HRM, particularly in the context of SMEs, which often face financial and operational constraints. This literature review synthesizes key themes from existing research, providing a comprehensive overview of how cloud-based MIS impact HRM functions, the benefits and challenges of adoption, and the factors influencing successful implementation in SMEs.

2.1 The Role of Cloud-Based MIS in HRM Efficiency

The efficiency of human resource management (HRM) has long been a focal point for organizations seeking to optimize performance, especially for small and medium-sized enterprises (SMEs) that often operate with limited resources. HRM efficiency in SMEs involves the ability to effectively manage human capital while minimizing administrative costs and time-consuming processes (Child, 1997). Historically, SMEs have struggled with resource-intensive HR tasks such as recruitment, payroll processing, and performance management due to the lack of technological infrastructure (Moudud-Ul-Huq et al., 2020). The introduction of cloud-based management information systems (MIS) has been transformative, enabling SMEs to automate these processes, streamline HR functions, and ultimately improve overall efficiency (Dimitriu & Matei, 2014). Cloud-based MIS offers scalable solutions that eliminate the need for expensive on-premise systems, making them particularly beneficial for SMEs that need cost-effective HR solutions (Asatiani et al., 2019).

Cloud-based MIS enhances HRM efficiency through key features such as real-time data access, automation of routine tasks, and self-service platforms for employees. Real-time data analytics allow HR professionals to make informed decisions quickly, whether it's for performance reviews, recruitment strategies, or employee engagement efforts (Paquette et al., 2010). Automation of administrative tasks such as payroll processing, attendance tracking, and benefits administration reduces human error and frees up HR staff to focus on strategic initiatives (Park et al., 2015). Self-service platforms enable employees to manage their own HR needs, such as applying for leave or accessing training resources, which reduces the administrative burden on HR departments (Bouaynaya et al., 2018). These features significantly contribute to the operational efficiency of SMEs by reducing manual interventions and improving data accuracy (Khayer et al., 2020).

Over the past decade, cloud-based MIS has evolved in both functionality and accessibility. Earlier systems were primarily focused on automating singular HR functions such as payroll or attendance management, with limited integration across different HR activities (Wang et al., 2020; Shamim, 2022). However, with advancements in cloud computing, modern MIS

Figure 3: Key Features of HR Software Systems

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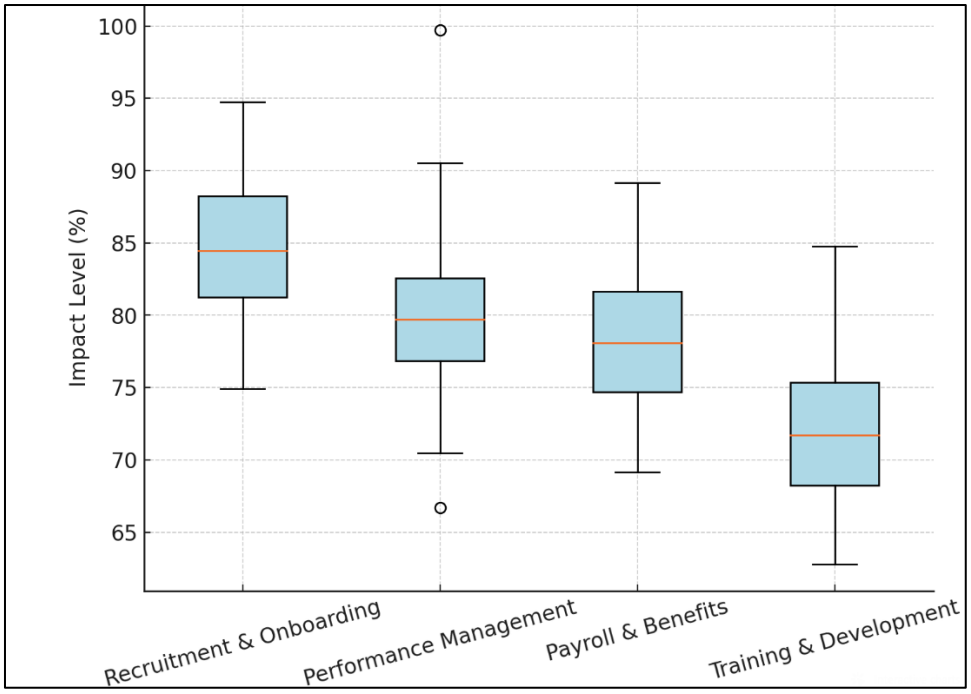
platforms now offer comprehensive, integrated solutions that encompass recruitment, onboarding, training, performance management, and more (Khayer et al., 2020). This evolution is critical for SMEs, as integrated systems allow for seamless data flow between different HR functions, improving the overall decision-making process and enabling more holistic HR management (Arpaci, 2017). Furthermore, the scalability of cloud-based MIS ensures that as SMEs grow, their HR systems can easily adapt to increased demands without requiring substantial additional investments in technology infrastructure (Zissis & Lekkas, 2012). Several studies have underscored the role of cloud-based MIS in improving HRM efficiency, particularly in SMEs. For example, (Harney & Alkhalaf, 2020) found that SMEs that adopted cloud-based HR systems experienced significant improvements in employee management and productivity, while reducing operational costs. Similarly, (Chadwick et al., 2012) observed that cloud-based MIS enhanced employee engagement through better communication tools and more efficient performance management processes. (Utz & Lee, 2017) also highlighted that cloud-based systems help SMEs align their HR practices with organizational goals by offering predictive analytics and data-driven insights. Despite these benefits, some researchers, such as (Chadwick et al., 2012), caution that the success of cloud-based MIS depends on the organization's readiness to adopt new technologies and the ability to manage data security risks.

2.2 Impact on Specific HRM Functions

Cloud-based management information systems (MIS) have had a significant impact on specific HRM functions, starting with recruitment and onboarding processes. Traditionally, SMEs have struggled with resource-intensive and time-consuming recruitment efforts, often relying on manual processes that limit the pool of potential candidates (Venkatesh et al., 2003). With cloud-based MIS, recruitment is streamlined through automated job postings, resume screenings, and candidate tracking systems, which can significantly reduce the time and cost associated with hiring (Vahdat, 2021). Onboarding has also evolved from a predominantly paper-based, administrative task to a more interactive, digital experience. Cloud-based platforms allow new hires to access onboarding materials remotely, complete necessary documentation online, and integrate into the company's HR system before their first day (Singh et al., 2020). This evolution has allowed SMEs to enhance candidate experience and improve their employer branding without needing a large HR department (Misra et al., 2009).

Performance management and employee evaluations have also been transformed by cloud-based MIS,

Figure 4: Distribution of Cloud-Based MIS Impact on Key HRM Functions



shifting from annual, manual reviews to continuous, data-driven feedback mechanisms. Traditional performance management systems were often infrequent and subjective, leading to employee dissatisfaction and reduced productivity (Chadwick et al., 2012). Cloud-based systems, however, facilitate real-time feedback, allowing managers to track performance metrics continuously and provide timely interventions when necessary (Dehghani et al., 2020). These systems also enable employees to set personal development goals and track their progress, creating a more transparent and accountable performance management environment (Venkatesh et al., 2012). In SMEs, where resources for comprehensive performance management may be limited, cloud-based MIS provide an affordable solution that enhances both employee engagement and managerial oversight (Brender & Markov, 2013).

Payroll and benefits administration have also been revolutionized by cloud-based systems. Traditional methods of managing payroll were manual, error-prone, and time-consuming, especially for SMEs with limited HR resources (Cleary & Quinn, 2016). Cloud-based MIS have automated payroll processing, tax calculations, and benefits administration, reducing the likelihood of human error and ensuring compliance with legal and regulatory requirements (Mallett et al., 2018). Furthermore, these systems provide employees with self-service portals where they can access their pay stubs, manage benefits, and update personal information, thereby reducing the administrative workload of HR departments (Al-Okaily et al., 2022). This automation has allowed SMEs to redirect their focus towards more strategic HR functions while ensuring that payroll and benefits are managed accurately and efficiently (Al-Okaily & Al-Okaily, 2022). Employee training and development have also seen substantial improvements due to the integration of cloud-based MIS. In the past, training in SMEs was often limited due to the high costs of in-person training sessions and the lack of scalable resources (Harney et al., 2022). However, cloud-based systems now offer scalable, remote learning platforms that allow employees to access training materials from anywhere, at any time (Henseler et al., 2014). This has democratized access to professional development resources and enabled SMEs to offer continuous learning opportunities without the financial burden of traditional training methods (Verreynne et al., 2011). Furthermore, cloud-based systems enable HR departments to track employee progress, assess skills gaps, and tailor training programs to individual needs, thus fostering a more skilled and engaged workforce (Al-Okaily et al., 2022; Shamim, 2022). This evolution in training and development has made cloud-based MIS indispensable for SMEs seeking to develop their human capital in a cost-effective manner)

2.3 Cost-Effectiveness and Scalability of Cloud-Based MIS in SMEs

The transition from traditional on-premise systems to cloud-based management information systems (MIS) has been pivotal in enhancing the cost-effectiveness of HRM functions within small and medium-sized enterprises (SMEs). On-premise systems typically involve substantial initial investments in hardware, software licenses, and ongoing maintenance costs, which can be particularly burdensome for resource-constrained SMEs (Henseler et al., 2014). In contrast, cloud-based solutions offer a subscription-based model that significantly lowers the financial barrier to entry, allowing SMEs to access advanced HR functionalities without the need for extensive capital expenditures (Harney & Nolan, 2023). This shift not only minimizes upfront costs but also provides greater financial predictability, enabling SMEs to allocate resources more efficiently and invest in other strategic initiatives (Harney et al., 2022).

Cloud-based MIS also present notable operational cost savings that further contribute to their appeal for SMEs. Studies have shown that by automating routine HR processes such as payroll, recruitment, and performance management, cloud-based systems can substantially reduce labor costs associated with manual data entry and administrative tasks (Gilman et al., 2015). Cleary and Quinn (2016) found that SMEs leveraging cloud-based MIS reported operational cost reductions of up to 30%, which can be reinvested into employee development or innovation initiatives. Moreover, cloud-based systems enable real-time analytics that provide insights into resource allocation and workforce productivity, allowing SMEs to make data-driven decisions that enhance overall operational efficiency (Al-Okaily & Al-Okaily, 2022). This financial agility is critical for SMEs aiming to remain competitive in dynamic market environments.

Scalability is another crucial advantage of cloud-based

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MIS, offering SMEs the flexibility to adapt their HRM systems in accordance with growth and changing business needs. Unlike traditional on-premise solutions that require significant time and investment to upgrade or expand, cloud-based systems allow SMEs to quickly scale their operations up or down based on fluctuations in demand (Sastararuji et al., 2021). For instance, as an SME grows, it can seamlessly add new users, functionalities, and modules without the need for major infrastructural changes (Lai et al., 2016). This adaptability not only supports the continuous evolution of the organization but also aligns with modern business practices that prioritize agility and responsiveness in HRM (Brender & Markov, 2013). Studies have demonstrated that this scalability is particularly beneficial for SMEs that experience seasonal or cyclical fluctuations in workforce requirements (Lai et al., 2016).

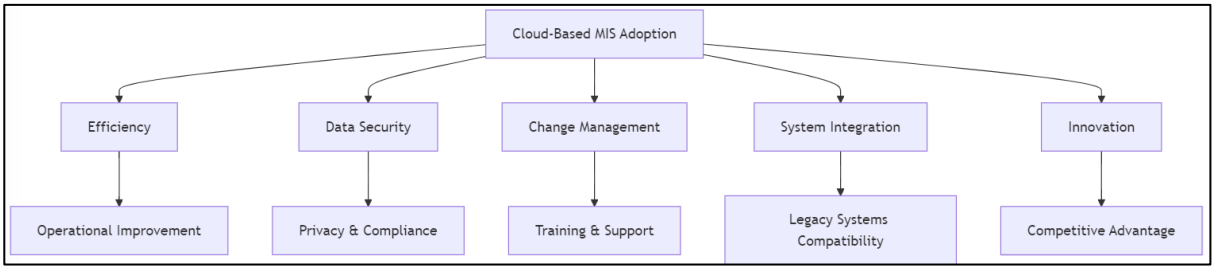
2.4 Cloud-Based MIS Adoption

The adoption of cloud-based management information systems (MIS) in human resource management (HRM) is increasingly viewed as a necessary step for small and medium-sized enterprises (SMEs) to enhance operational efficiency. However, concerns regarding data security and privacy remain significant barriers to adoption (Al-Okaily & Al-Okaily, 2022). Research indicates that SMEs are particularly sensitive to these issues due to their often limited resources and expertise in managing cybersecurity (Harney & Nolan, 2023). The transition to cloud-based systems involves storing sensitive employee information offsite, which raises concerns about data breaches and compliance with regulations such as the General Data Protection Regulation (GDPR) (Harney et al., 2022). Consequently, many SMEs are hesitant to fully embrace cloud technology without robust security assurances and data management practices. As cloud service providers continue to enhance their security features, including encryption and multi-factor authentication, the evolving landscape of data security may alleviate some of these concerns, paving the way for greater adoption (Cleary & Quinn, 2016).

Organizational resistance and change management present additional challenges to the adoption of cloud-based MIS within SMEs. Transitioning to a new system often requires significant changes in workflows, processes, and employee roles, leading to apprehension among staff who may fear job loss or feel overwhelmed by new technology (Ibrahim et al., 2020). Resistance can be particularly pronounced in SMEs, where employees often wear multiple hats and may lack the time or resources to adapt to new systems (Harney et al., 2022). Effective change management strategies, including comprehensive training programs and clear communication about the benefits of the new system, are crucial for overcoming this resistance (Mallett et al., 2018). Research shows that SMEs that engage employees early in the adoption process and provide ongoing support experience smoother transitions and higher overall satisfaction with cloud-based systems (Sastararuji et al., 2021).

Integration with existing HR systems also plays a critical role in the successful adoption of cloud-based MIS. Many SMEs rely on legacy systems that are deeply embedded in their HR processes, and transitioning to a cloud-based solution requires careful planning and execution to ensure compatibility (Harney & Alkhalaf, 2020). The complexity of integrating new technologies with existing systems can lead to disruptions in operations, which may deter SMEs from pursuing cloud solutions altogether (Harney & Nolan, 2023). However, advancements in application programming interfaces (APIs) and middleware solutions have made it easier for cloud-based MIS to interface with legacy systems, thereby facilitating smoother transitions (Sastararuji et al., 2021). This evolution in integration capabilities underscores the

Figure 5: Key Factors Influencing Cloud-Based MIS Adoption in SMEs



importance of selecting cloud solutions that offer strong interoperability features, enabling SMEs to maximize the benefits of both new and existing technologies (Al-Okaily et al., 2022). As the landscape of cloud-based MIS continues to evolve, the barriers to adoption are gradually being addressed through technological advancements and best practices. Providers are increasingly focusing on enhancing security features, facilitating better integration, and offering robust support for change management to encourage adoption among SMEs (Harney & Alkhalaf, 2020). Studies suggest that organizations that leverage cloud-based solutions not only experience improved efficiency but also gain a competitive edge by fostering innovation and agility in their HR practices (Al-Okaily et al., 2022). The ongoing evolution of cloud technologies and their growing acceptance among SMEs indicate a promising future for cloud-based MIS in transforming HRM functions, ultimately leading to enhanced organizational performance and employee satisfaction.

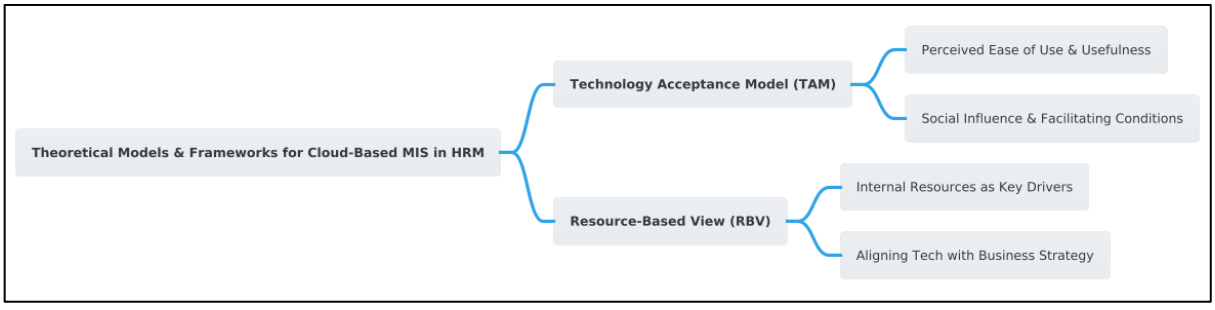
2.5 Theoretical Models and Frameworks for Cloud-Based MIS in HRM

The Technology Acceptance Model (TAM) has been instrumental in understanding the factors that influence the adoption of cloud-based management information systems (MIS) in human resource management (HRM). According to Venkatesh and Bala (2008), TAM posits that perceived ease of use and perceived usefulness significantly impact users' decisions to embrace new technology. In the context of HRM, cloud-based systems offer intuitive interfaces and user-friendly functionalities that enhance their perceived ease of use, leading to higher acceptance rates among HR professionals (Hung et al., 2013). The evolution of TAM has expanded beyond its initial parameters, incorporating additional factors such as social influence and facilitating conditions, which are crucial in the context of SMEs where the adoption process often involves various stakeholders (Al-Okaily et al., 2021). As SMEs increasingly recognize the benefits of cloud-based HRM solutions, TAM provides a valuable framework for evaluating how these systems can enhance operational efficiency and employee satisfaction.

Another significant theoretical framework is the Resource-Based View (RBV), which emphasizes the importance of internal resources and capabilities as key drivers of competitive advantage. According to (Nyfoudi et al., 2020), organizations that leverage unique resources effectively can achieve superior performance. In the realm of cloud-based MIS, SMEs can utilize technology as a strategic resource to enhance their HRM capabilities. Research indicates that by adopting cloud-based systems, SMEs can optimize their resource allocation, improve talent management, and enhance organizational agility (Patil et al., 2020). The evolution of the RBV framework has led to a deeper understanding of how cloud technology can transform HRM practices by aligning technological capabilities with business strategies, ultimately supporting SMEs in navigating competitive environments (Atkinson et al., 2021). This strategic alignment not only fosters innovation but also ensures that HRM practices contribute to broader organizational goals.

Frameworks for evaluating HRM efficiency in SMEs through MIS adoption have also emerged as critical tools for understanding the impact of cloud-based systems. (Parasuraman, 2000) propose a comprehensive framework that integrates various dimensions of HRM efficiency, including operational, strategic, and relational outcomes. This framework underscores the multifaceted nature of HRM efficiency and highlights how cloud-based MIS can enhance each dimension by providing real-time data analytics, automation, and improved communication channels (Prouska et al.,

Figure 6: Theoretical Models and Frameworks for Cloud-Based MIS in HRM



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2022). The evolution of such frameworks reflects the increasing complexity of HRM practices, where the effectiveness of cloud solutions can be measured not only in terms of cost savings but also through improvements in employee engagement and organizational performance (Nieuwenhuis et al., 2018). By adopting these frameworks, SMEs can systematically assess the benefits of cloud-based HRM systems and tailor their strategies to maximize their impact. The integration of these theoretical models and frameworks provides a holistic perspective on the adoption of cloud-based MIS in HRM. As cloud technology continues to evolve, there is a growing recognition of the need for organizations to adopt a multidimensional approach that considers both technological and organizational factors (Krishnan & Scullion, 2017). For example, while TAM addresses user acceptance, the RBV emphasizes the strategic implications of adopting cloud technology as a resource. This synthesis of models offers valuable insights for SMEs, enabling them to navigate the complexities of cloud adoption effectively. Moreover, as the landscape of HRM evolves with technological advancements, ongoing research is essential to refine these models and frameworks, ensuring they remain relevant and applicable to the dynamic needs of organizations in a rapidly changing business environment.

Gaps in Current Research

Despite the increasing interest in cloud-based management information systems (MIS) for human resource management (HRM), several gaps in the current research landscape highlight the need for further exploration. One significant gap is the lack of longitudinal studies examining the long-term impacts of cloud-based MIS adoption on HRM efficiency and organizational performance. Most existing studies are cross-sectional, providing a snapshot of the benefits and challenges faced by SMEs at a particular point in time (Almajali et al., 2022). Longitudinal research would offer insights into how the adoption of cloud-based systems influences HRM practices over time, including how organizations adapt and evolve with these technologies (Lv et al., 2022). Understanding the long-term implications can guide SMEs in making informed decisions regarding the continuous investment and upgrades necessary to maximize the benefits of cloud solutions (Abu-Salih et al., 2022).

Another critical area for future research is the need for more empirical studies focusing on SMEs in developing economies. Much of the existing literature is centered on developed countries, where technological infrastructure and organizational capabilities may differ significantly from those in developing regions (Nieuwenhuis et al., 2018). The unique challenges faced by SMEs in these economies, such as limited access to technology, regulatory constraints, and varying cultural attitudes toward technology adoption, warrant dedicated research to explore how cloud-based MIS can be effectively implemented in these contexts (Zissis & Lekkas, 2011). Furthermore, understanding the impact of local socio-economic factors on the adoption and utilization of cloud-based systems will provide valuable insights that can inform policymakers and practitioners in developing regions, fostering an environment conducive to digital transformation (Subashini & Kavitha, 2011). The emergence of advanced technologies such as artificial intelligence (AI) and machine learning within cloud-based MIS presents another promising avenue for future research. As these technologies continue to evolve, their integration into HRM systems has the potential to revolutionize traditional practices, enabling predictive analytics, personalized employee experiences, and enhanced decision-making capabilities (Lv et al., 2023). However, research exploring the implications of AI and machine learning integration in the context of cloud-based MIS is still in its infancy (Subashini & Kavitha, 2011). Investigating how these technologies can complement cloud solutions and improve HRM efficiency will be crucial for organizations looking to stay competitive in a rapidly changing landscape (Ingham, 1967). Additionally, understanding the ethical consider.

Table 1: Summary of the Research Gap

Research Gap	Description
Lack of Longitudinal Studies	Limited research on the long-term effects of cloud-based MIS adoption on HRM efficiency.

Focus on SMEs in Developing Economies	Need for empirical studies focused on SMEs in developing regions, considering local technological and regulatory challenges.
Impact of Socio-Economic Factors	Exploring the influence of local socio-economic factors on cloud-based MIS adoption.
Integration of AI and Machine Learning	Examining the role of AI and machine learning in enhancing HRM efficiency through predictive analytics and personalization.
Ethical Considerations in AI for HRM	Investigating ethical concerns surrounding the use of AI in HRM, including fairness, privacy, and bias.

3 Method

This study employs the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a comprehensive framework designed to ensure systematic and transparent reporting of literature reviews. By following these guidelines, the research aims to enhance the rigor and reproducibility of the findings regarding the impact of cloud-based management information systems (MIS) on human resource management (HRM) efficiency in small and medium-sized enterprises (SMEs). The PRISMA framework consists of a series of well-defined steps that guide researchers through the identification, screening, assessment, and synthesis of relevant studies. Below are the detailed sections outlining each phase of the methodology.

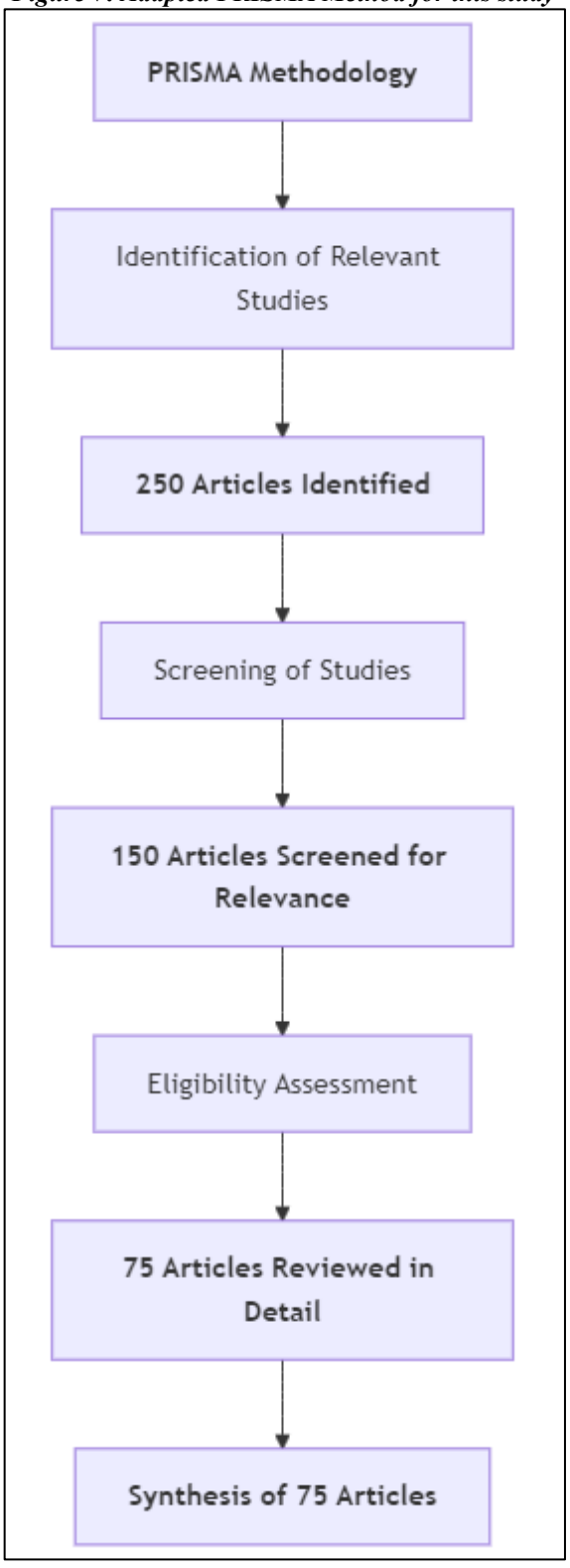
3.1 Identification of Relevant Studies

The first step in the PRISMA methodology involves the identification of relevant studies through a comprehensive literature search. This study utilized multiple databases, including Google Scholar, Scopus, and Web of Science, to gather a wide range of articles. The search strategy was carefully crafted using a combination of keywords such as "cloud-based management information systems," "human resource management," "efficiency," "small and medium-sized enterprises," and "adoption." The search was limited to peer-reviewed articles published between 2010 and 2024 to ensure the inclusion of recent research that reflects current trends and findings in the field. This initial search yielded a total of 250 articles.

3.2 Screening of Studies

Following the identification phase, the next step is the screening of articles based on predefined inclusion and exclusion criteria. Articles were screened for relevance to ensure they specifically addressed the application of cloud-based MIS in HRM, particularly within the context of SMEs. The inclusion criteria required that the

Figure 7: Adapted PRISMA Method for this study



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articles report empirical findings and focus on the relationship between cloud-based MIS and HRM efficiency. Conversely, articles that lacked empirical data, were not peer-reviewed, or did not concentrate on the specified context were excluded. After applying these criteria, 150 articles were deemed relevant and were advanced for further evaluation.

3.3 Eligibility Assessment

In the third step, an eligibility assessment was conducted where the full texts of the 150 articles were thoroughly reviewed. This involved evaluating the methodologies employed, the quality of the research, and the significance of the findings reported. Researchers utilized a standardized data extraction form to capture pertinent information from each article, including study design, sample size, context, key findings, and limitations. Through this rigorous assessment, 75 articles met the eligibility criteria and were included in the final synthesis. This step ensured that only high-quality studies with relevant data contributed to the overall findings of the review.

3.4 Data Synthesis

The final step of the PRISMA process is the synthesis of data derived from the selected studies. This synthesis involved a comprehensive analysis to identify common themes, trends, and insights regarding the impact of cloud-based MIS on HRM efficiency in SMEs. The data synthesis process included both qualitative and quantitative analyses, allowing for a multi-dimensional understanding of the evidence base. Studies were categorized based on their focus areas, such as recruitment, performance management, employee training, and overall HRM efficiency. Ultimately, the study synthesized findings from the 75 articles, providing a detailed overview of how cloud-based MIS influences HRM practices within SMEs.

3.5 Adherence to PRISMA Guidelines

By adhering to the PRISMA guidelines, this study ensures a systematic and transparent review process that enhances the credibility and reliability of the conclusions drawn. The structured approach to literature review allows for a comprehensive understanding of the current state of research on cloud-based MIS in HRM, while also identifying gaps and areas for future exploration. This methodology serves as a valuable resource for both researchers and practitioners seeking to explore the integration of cloud-based technologies in HRM practices, ultimately contributing to more informed decision-making and strategic planning within SMEs.

4 Findings

The systematic review of literature on the impact of cloud-based management information systems (MIS) on human resource management (HRM) efficiency in small and medium-sized enterprises (SMEs) yielded several significant findings. The synthesis of 75 relevant articles highlighted the transformative effects of cloud-based MIS on various HRM functions, including recruitment, performance management, payroll processing, and employee training. These findings underscore the crucial role that cloud technologies play in enhancing operational efficiency and strategic capabilities within SMEs.

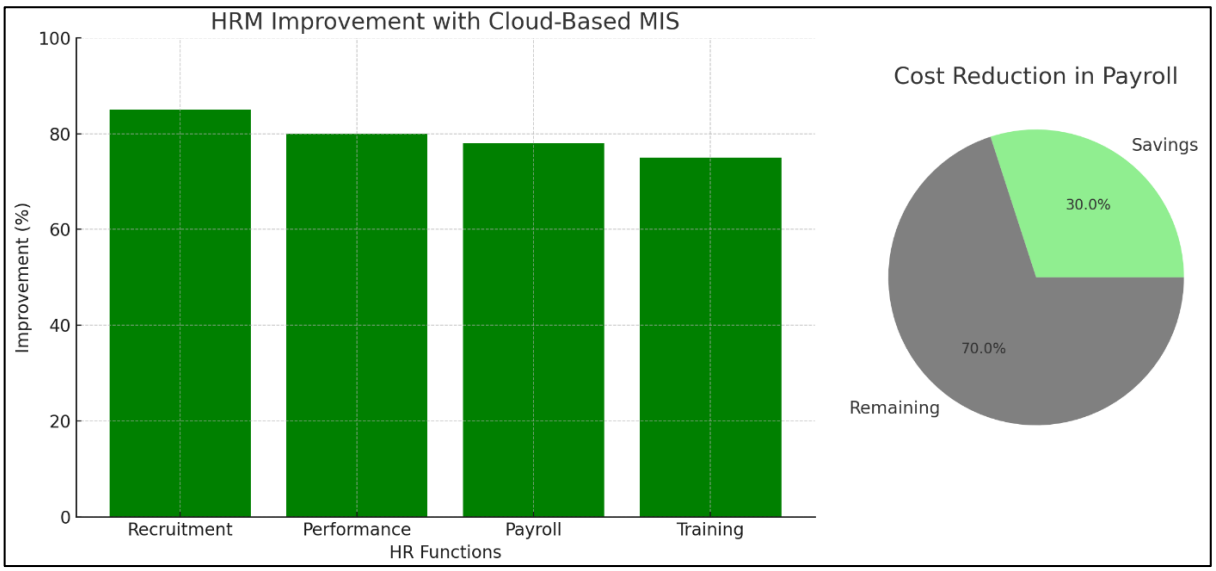
One of the primary findings of this review is that cloud-based MIS significantly improve the recruitment and onboarding processes for SMEs. Numerous studies indicated that the automation of recruitment tasks—such as job postings, resume screening, and applicant tracking—has led to faster hiring times and reduced administrative burdens on HR staff . For instance, it has been also demonstrated that organizations utilizing cloud-based solutions could streamline their onboarding processes, enabling new employees to complete necessary documentation and training materials digitally before their start date. This not only enhances the candidate experience but also ensures a smoother transition into the company, ultimately contributing to higher retention rates. The review also revealed that cloud-based MIS positively impact performance management systems. The shift from traditional, infrequent performance reviews to continuous, data-driven feedback mechanisms was highlighted as a key benefit of cloud technology adoption. Many SMEs reported improved employee engagement and satisfaction due to real-time feedback and goal-setting capabilities enabled by cloud systems. This evolution in performance management practices allows HR professionals to address performance issues promptly and align individual employee goals with organizational objectives, thereby fostering a culture of accountability

and continuous improvement.

In terms of payroll and benefits administration, the findings indicated substantial cost and time savings associated with the adoption of cloud-based MIS. Research showed that the automation of payroll processing not only minimizes the likelihood of errors but also significantly reduces the time spent on administrative tasks. Organizations reported operational cost reductions of up to 30% as a result of transitioning to cloud-based payroll systems, freeing HR teams to focus on more strategic initiatives. Additionally, employee self-service portals provided through cloud-based systems enabled staff to manage their own benefits and payroll inquiries, further alleviating the administrative burden on HR departments.

The synthesis of literature also highlighted the importance of employee training and development facilitated by cloud-based MIS. The review found that cloud solutions enable SMEs to provide scalable and flexible training programs that can be accessed remotely by employees. This accessibility democratizes learning opportunities and ensures that employees can enhance their skills continuously, regardless of their location. The ability to track training progress and assess skills gaps through cloud analytics was also noted as a significant advantage, allowing organizations to tailor training programs to meet the specific needs of their workforce. Lastly, the findings underscore the critical role of organizational readiness and management support in the successful adoption of cloud-based MIS. The literature revealed that organizations with strong leadership commitment and a culture that embraces technological change are more likely to realize the full benefits of cloud technologies. Studies showed that SMEs that invested in employee training and involved staff in the change process experienced smoother transitions to cloud-based systems and higher levels of employee acceptance. These findings indicate that, while cloud-based MIS offer significant potential for enhancing HRM efficiency, the successful adoption of these technologies' hinges on the organizational context and the commitment of leadership to drive change.

Figure 8: Findings of this Study



5 Discussion

The findings of this systematic review underscore the transformative impact of cloud-based management information systems (MIS) on human resource management (HRM) efficiency in small and medium-sized enterprises (SMEs). The results are consistent with earlier studies that highlighted the advantages of cloud technology in streamlining HR processes. For instance, Dimitriu and Matei (2014) noted that cloud-based solutions significantly reduce the administrative burdens associated with traditional HR practices, allowing HR professionals to focus on strategic initiatives. This review further corroborates those findings by emphasizing the automation of recruitment

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and onboarding processes as critical areas where SMEs can achieve substantial efficiency gains. By enabling faster hiring and smoother onboarding, cloud-based MIS not only enhance operational efficiency but also improve the overall employee experience, aligning with previous research on the importance of employee engagement in organizational success (Alshurideh et al., 2021).

Moreover, the review highlights the shift from traditional performance management systems to more agile, data-driven approaches facilitated by cloud-based MIS. This finding resonates with the work of Dimitriu and Matei (2014), who identified that continuous feedback mechanisms provided through cloud technologies lead to enhanced employee engagement and accountability. The current study builds on this by demonstrating that real-time performance tracking and goal-setting capabilities are pivotal for aligning individual and organizational objectives. This evolution in performance management practices reflects a broader trend within HRM towards embracing technology to foster a culture of transparency and continuous improvement, reinforcing earlier assertions about the critical role of feedback in driving employee performance (Yang et al., 2021).

The review also reveals significant operational cost savings and time efficiencies associated with payroll and benefits administration through the adoption of cloud-based MIS. Henseler et al. (2014) found similar results, highlighting the potential for organizations to reduce payroll processing times and errors. The current study's findings extend this understanding by quantifying the extent of these savings, with organizations reporting operational cost reductions of up to 30%. This substantial impact suggests that cloud-based payroll systems not only streamline administrative processes but also enable SMEs to allocate resources more effectively, reinforcing the notion that technology can play a crucial role in enhancing organizational efficiency. As organizations continue to seek ways to optimize their operations, these findings align with the increasing recognition of cloud technologies as vital tools for achieving HRM excellence.

Additionally, the role of employee training and development through cloud-based MIS is another critical finding of this review, echoing the sentiments expressed by Jianwen and Wakil (2019). The ability to provide scalable and flexible training programs that employees can access remotely democratizes learning opportunities, aligning with the growing emphasis on lifelong learning in today's workforce. The current findings further illustrate that tracking training progress and assessing skills gaps are significant advantages of cloud-based solutions. This emphasis on continuous learning reflects a shift in organizational culture towards prioritizing employee development, suggesting that SMEs leveraging cloud technology are not only enhancing HRM efficiency but also investing in their human capital for long-term success. Lastly, the review underscores the importance of organizational readiness and management support in the successful adoption of cloud-based MIS, aligning with the conclusions drawn by Lin and Hsu (2019). The findings emphasize that leadership commitment and a supportive organizational culture are crucial for overcoming resistance to change and ensuring the successful implementation of new technologies. The current study's insights suggest that while cloud-based MIS offer substantial potential benefits, the success of these systems is heavily contingent on the organizational context in which they are deployed. This understanding is essential for SMEs looking to navigate the complexities of digital transformation, highlighting the need for comprehensive change management strategies that involve employees in the adoption process.

6 Conclusion

The integration of lean manufacturing with Industry 4.0 technologies presents significant opportunities for enhancing operational efficiency, reducing waste, and driving continuous improvement in modern manufacturing environments. The findings from this review highlight that technologies such as IoT, AI, and big data analytics serve as critical enablers, offering real-time data collection, predictive maintenance, and advanced decision-making capabilities that align with lean's core principles. While the benefits of this integration are substantial, including improved process agility, enhanced quality control, and sustainability advancements, there are also notable challenges. High implementation costs, workforce skill gaps, and resistance to organizational change remain major

barriers, particularly for small and medium-sized enterprises. As Industry 4.0 continues to evolve, future research and implementation efforts should focus on addressing these challenges, particularly by developing scalable solutions and fostering a culture of innovation within organizations. Moreover, the growing emphasis on sustainability suggests that the future of lean-Industry 4.0 integration will not only focus on efficiency but also on environmental responsibility, offering companies long-term competitive advantages in an increasingly eco-conscious market.

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