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HRM 4.0 IN INDIA: CHALLENGES AND OPPORTUNITIES IN MODERN HR PRACTICES

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ABSTRACT
This article provides a comprehensive exploration of Industry 4.0, defining it as the Fourth Industrial Revolution characterized by profound digitalization, advancements in genetics, artificial intelligence, and extensive connectivity. Beginning with an overview and detailed research methodology, the article underscores the necessity for adaptable work approaches encompassing time, wages, tasks, and workspace. Continuous up skilling is crucial to align with technological advancements, accompanied by an analysis of integration challenges in production processes and proposed solutions.
HRM 4.0 is examined in detail, leveraging data, artificial intelligence, and automation to enhance decision-making and prioritize employee well-being, diversity, and inclusion. Key shifts in HR practices include sector-specific skill identification, technological alignment, and communication tool modernization, alongside retraining initiatives.
The study focuses on current HRM practices in India, highlighting challenges in adopting HRM 4.0 technologies and the pivotal role of HR professionals in their implementation. Opportunities for efficiency gains and enhanced employee satisfaction are contrasted with risks for non-adopters. Identified challenges encompass resistance to change, skill gaps, data security concerns, implementation costs, system integration issues, and awareness deficits.
Findings indicate that Indian organizations embracing HRM 4.0 practices achieve higher efficiency, productivity, and talent retention. Conversely, those lagging risk losing competitive edge. The article concludes with recommendations for workshops to enhance HR professionals' skills and integrating HRM 4.0 into higher education curriculum, aiming to bridge academic-industry gaps effectively.

Keywords: *Industry 4.0, HRM 4.0, Digital Transformation, Technological Advancements, HRM Practices, Workforce Flexibility, etc.*

1. INTRODUCTION

HRM 4.0 represents a digital transformation in leading and managing HR functions, integrating IT and new technology into HR system design and execution. Human Resource Management (HRM) has undergone substantial evolution over the years, with talent management remaining a central focus (Lewis & Heckman, 2006; Schiemann, 2014; Ariss,

Cascio & Paauwe, 2014). The advent of major technological advancements have led to the emergence of Human Resource Management 4.0 (HRM 4.0), responding to disruptions in skills and jobs caused by technological advancements (KPMG, 2020). The increased virtualization, high volume interactions, and rapid information sharing have reshaped talent management processes in many organizations (Ariss et al., 2014).

2. LITERATURE REVIEW

Saini & Budhwar, (2021) stated that the current state of HRM practices in India reveals a mixed picture of adoption and resistance. Studies indicate that Indian organizations that have adopted HRM 4.0 practices report increased efficiency, productivity, and talent retention

Pandey & Pattnaik (2020) in his literature underscores the crucial role of HR professionals in navigating these challenges and effectively implementing HRM 4.0 technologies

Strohmeier (2020) highlighted Key shifts in HR practices identified in the literature include sector-specific skill identification, technological alignment, modernization of communication tools, and extensive retraining initiatives

Dhamija (2019) focussed on challenges remain significant for many organizations, including resistance to change, skill gaps, data security concerns, high implementation costs, and a lack of awareness about the benefits of HRM 4.0

Parry & Battista (2019) suggested changes are essential for organizations to maintain competitiveness in the evolving industrial landscape

Hirschi (2018) includes paradigm shift necessitates the adaptation of traditional work approaches to include flexible work hours, revised wage structures, varied task allocations, and modernized workspaces

Jabbour et al., (2018) stated In terms of practical applications, the literature recommends several strategies to facilitate the transition to HRM 4.0. These include conducting workshops to enhance the skills of HR professionals, integrating HRM 4.0 concepts into higher education curricula to bridge the gap between academia and industry, and promoting awareness about the benefits of advanced HRM practices Such measures are deemed essential for building a workforce that is capable of thriving in the dynamic environment of Industry 4.0

Müller et al., (2018) in his literature highlights various integration challenges within production processes, such as resistance to change, skill gaps, data security concerns, implementation costs, and system integration issues

Wright & Ulrich, (2017) analysis suggests that proactive adoption of HRM 4.0 can result in substantial organizational benefits, including better decision-making capabilities, enhanced employee engagement, and improved organizational agility

Schwab (2017) analysed that the advent of Industry 4.0, often termed the Fourth Industrial Revolution, has heralded a transformative era marked by significant advancements in digitalization, genetics, artificial intelligence (AI), and connectivity

Hecklau et al., (2016) focuses Continuous upskilling and reskilling are emphasized as crucial strategies for aligning the workforce with rapid technological advancements

Bondarouk & Brewster, (2016) identified in his paper Human Resource Management (HRM) 4.0 emerges as a pivotal concept within Industry 4.0, leveraging data analytics, AI, and automation to enhance decision-making processes and prioritize employee well-being, diversity, and inclusion

Kane et al., (2015) in his literature further explore the implications of not adopting HRM 4.0. Organizations that lag in integrating these advanced HR practices risk losing their competitive edge, facing inefficiencies, and struggling with lower employee satisfaction

Overall, the literature offers a thorough summary of the challenges and opportunities associated with Industry 4.0 and HRM 4.0, highlighting the need for continuous adaptation and proactive strategies to leverage the benefits of these transformative changes.

2.1. Current Status of Industry 4.0 in India

Since the 1970s, industries in India and across the globe have increasingly adopted automation and robotic technologies powered by advancements in electronics and information technology. The current state of technology primarily involves automating individual machines. The widespread adoption of information and communication technologies within the manufacturing sector is now driving significant advancements in production processes and logistics.

India, being the sixth-largest manufacturing country, faces the challenge of balancing a growing population's demands with the need for enhanced productivity and quality within limited timeframes. Globally, the Industry 4.0 market is projected to reach INR 13,90,647 crore by 2023. Countries such as the U.S., China, Japan, and several European nations like the U.K., Ireland, Sweden, and Austria have already begun embracing Industry 4.0. In India, the manufacturing sector is a critical component of the country's long-term vision, reflected in government initiatives like the "Make in India" campaign. The government aims to increase manufacturing's GDP contribution from the current 17% to 25% by 2022 through

reforms such as the Goods and Services Tax (GST) and relaxed foreign direct investment (FDI) policies.

However, India trails behind its global counterparts in adopting Industry 4.0. A large portion of the manufacturing sector remains in the post-electrification phase, relying on technologies that operate in isolation. The integration of physical systems with cyber platforms, the foundation of Industry 4.0, is still at a nascent stage. This challenge is particularly pronounced in the Micro, Small, and Medium Enterprises (MSME) segment, where access to automation is limited due to high costs.

The current scenario of Industry 4.0 adoption in India can be summarized with the following key barriers:

1. Lack of awareness about Industry 4.0 technologies.
2. Absence of a systematic approach to modernization.
3. Resistance to adopting new technologies.
4. Dependence on cheap labor, which discourages investment in automation.
5. Limited production volumes, making automation less cost-effective.
6. Insufficient availability of skilled personnel to implement automation.

By addressing these challenges, India can accelerate its progress towards becoming a global leader in Industry 4.0 adoption.

3 OBJECTIVES

1. To Analyse the Impact of Industry 4.0 on HR Practices in India
2. To Investigate the Challenges and Opportunities of HRM 4.0 Implementation in India
3. To Propose Strategies for challenges of HRM 4.0

4.0 METHOD, DATA AND ANALYSIS

The analytical method, incorporating descriptive analysis through various literature studies, was used to strengthen the analysis with theoretical insights from experts on HR practices in the era of the Industrial Revolution 4.0. This approach aims to develop knowledge and theory about human resource opportunities and challenges related to HR.

4.1 Impact of Industry 4.0 on HRM Practices

Industry 4.0, characterized by advanced technologies like artificial intelligence, the Internet of Things (IoT), big data, robotics, and automation, has a profound impact on Human Resource Management (HRM) practices**.**

Employment: Research indicates that employment is expected to grow by 6% in the 2020s, increasing consumption and impacting the economy. However, technological unemployment will arise due to the spread of robots. The definition of the workforce will change, incorporating consultants, freelancers, and other non-traditional roles.

	Must	**Should**	**Could**
Technical	IT knowledge and abilities, Knowledge Management, Computer programming/ coding abilities	IT knowledge and abilities, Knowledge Management, Computer programming/ coding abilities	IT knowledge and abilities, Knowledge management, computer programming/coding abilities
	Data and information processing and analytics	Interdisciplinary/generic knowledge about technologies and organisations	Specialised knowledge about technologies
	Statistical knowledge	Interdisciplinary/ generic knowledge about technologies and organizations	Specialized knowledge about technologies
	Organizational and process understanding	Specialized knowledge of manufacturing activities and processes	Awareness of ergonomics
	Ability to interact with modern interfaces (human-machine/ human-robot)	Awareness of IT security and data protection	Understanding of legal affairs
Personal Qualifications and skills	Self and time management Adaptability and ability to change Team working abilities Social skills Communication skills	Trust in new technologies Mind-set for continuous improvement and lifelong learning	

Gehrke et al (2015), "Industry 4.0, A Discussion of Qualifications and Skills in the Factory of the Future

a) **Performance Management**: New performance measurement tools will emerge, focusing on continuous monitoring, performance coaching, staff development, and digital systems integration.
b) **Reaching the Talent:** Companies will face skill shortages in technical fields. They need to establish talent management systems and integrate them into HR processes to remain competitive.
c) **Training:** Training becomes crucial with Industry 4.0, requiring the recruitment of intelligent machines and skilled workers. The education system must adapt to these developments.
d) **Data-Based Management**: Decisions concerning employees will increasingly rely on HR analytics, making data-driven management vital.

e) **Working Environments:** Flexible work environments will become the norm, moving away from the traditional 9am-5pm shift.

f) **Social Media:** Social media will enhance employee communication and responsibility, leading to a proactive organizational culture.

g) **Business and Life Balance:** HR departments must focus on improving job quality through recreation rooms, sports programs, and performance enhancement initiatives.

4.2 OPPORTUNITIES AND CHALLENGES

These are the challenges and opportunities face by modern HR

4.2.1 OPPORTUNITIES.

Modern HR has several opportunities which are driven by HRM 4.0 are mentioned below

a) Data-Driven Decision Making:

Leveraging big data and analytics to gain insights into employee performance, satisfaction, and retention. Using predictive analytics to anticipate workforce trends, such as turnover rates, skill shortages, and training needs.

b) Enhanced Employee Experience:

Providing personalized experiences and services to employees, such as customized learning and development programs. Empowering employees with self-service portals for accessing HR services, such as benefits, payroll, and leave management.

c) Automated and Streamlined Processes:

Automating repetitive and administrative tasks such as payroll processing, recruitment screening, and data entry. Utilizing AI for resume screening, matching candidates to job profiles, and managing employee inquiries through chatbots.

d) Remote Work and Collaboration Tools

Supporting remote and hybrid work models with virtual collaboration tools and platforms. Using virtual reality (VR) and augmented reality (AR) for immersive onboarding experiences and training simulations.

e) **Talent Management and Development:**

Implementing learning management systems (LMS) that use AI to recommend courses and training based on career paths and skill gaps.Using real-time feedback and continuous performance management tools to foster employee growth and development.

f) **Strategic Workforce Planning:**

Identifying future skills needs and aligning training programs to bridge skill gaps. Adapting to changing business needs with agile workforce strategies, such as gig work and talent marketplaces.

g) **Employee Well-being and Engagement:**

Offering digital solutions for mental health, fitness, and well-being, including telehealth services and wellness apps. Using sentiment analysis and engagement surveys to gauge employee morale and address concerns proactively.

h) **Cybersecurity and Data Privacy:**

Ensuring robust data security measures to protect sensitive employee information. Utilizing technology to comply with regulations and maintain transparency in HR practices.

4.2.2 CHALLENGES

Due to Industry 4.0 and HRM 4.0 there are various challenges faced and they are listed below

a) Recruitment

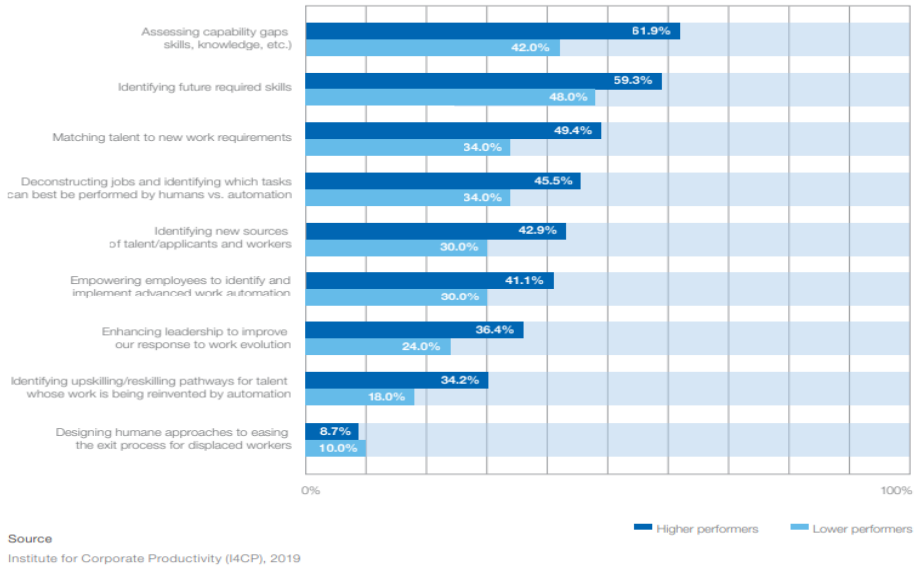
The first challenge is how to recruit for the new job roles that have been brought about by the fourth industrial revolution. Also, this has brought about challenges and opportunities, including in terms of the sourcing and retention of key technical personnel and senior executives who can effectively manage change. Companies should consider innovative approaches to recruiting should emphasize competencies rather than relying solely on qualifications such as degrees and job titles. Recruiters might utilize apps like Tinder to evaluate candidates' innovative thinking and skills, as formal degrees and traditional training become less significant. Additionally, companies are encouraged to collaborate with government agencies to enhance capability development and assess needs. The talent pool will include both recent graduates and experienced professionals, so recruiters need to refine their skills

b) Preparedness:

From the transformations caused by Industry 4.0, it is necessary to understand how its changes affect HRM, including the application of digital technologies to their tasks, introducing the concept of Human Resources Management 4.0 (HRM 4.0 - Smart HR 4.0). A new concept was developed through the application of technologies arising from Industry 4.0 in the HR sector, making it more agile, ensuring the welfare of workers before the labor market, and extracting the human potential for new tasks.

Therefore, HRM 4.0 currently needs to create a digital culture of digital people trained with digital tools, that is, with the right skills to increase productivity

The World Economic Forum (2020) reported that 84% of respondents will accelerate the digitalization of work (e.g., remote working and video conferencing) and 50% will accelerate the automation of jobs, thus increasing the use of digital technologies. This outlook is expected to bring challenges for the workforce as the Deloitte (Deloitte Company, 2021) survey states that less than 33% of workers are prepared for technological changes, especially remote work, which is a major challenge for HRM.



Source: Institute for Corporate Productivity (14CP), 2019

c) **Retention**

Minimizing employee turnover is essential for employers. The challenge lies in helping employees adapt their skills to more complex work environments and maintaining job stability in rapidly evolving workplaces.

4.3 PRACTICAL SECENARIO FOR ABOVE CHALLENGES AND OPPORTUNITES

a) Company Overview: Tata Steel, one of the largest steel manufacturing companies in India, has made significant strides in integrating Industry 4.0 technologies into its operations. The company focuses on innovation to maintain its leadership in the highly competitive steel market.

b) Implementation: Tata Steel initiated its Industry 4.0 journey by embracing smart manufacturing practices. It introduced several technologies, such as:

c) Automation and Robotics: Tata Steel deployed robotic systems to perform repetitive tasks, which improved safety and reduced human error in the production process.

Automated cranes, conveyors, and assembly systems have significantly optimized operations.

d) IoT and Sensors: The company used IoT-enabled devices to monitor real-time data from machines, which allowed for predictive maintenance. This helped in identifying faults before they occurred, leading to reduced downtime and cost savings.
e) AI and Data Analytics: Tata Steel implemented AI algorithms to analyze data from the production process. These insights were used to optimize supply chains, improve product quality, and enhance production efficiency. For example, AI-driven quality checks have minimized defects and improved customer satisfaction.
f) Digital Twin Technology: Tata Steel adopted digital twin technology to create a virtual replica of its manufacturing facilities. This technology provided real-time simulation, enabling better decision-making and process optimization.

Opportunities:

a) Increased Efficiency: Through automation and data analytics, Tata Steel improved operational efficiency, reducing production costs and increasing output.
b) Quality Enhancement: AI and real-time monitoring led to fewer defects, better quality control, and increased customer satisfaction.
c) Safety Improvements: The adoption of robotics and automation reduced human intervention in hazardous tasks, ensuring better safety for workers.

Challenges:

a) High Initial Investment: The implementation of Industry 4.0 required significant capital investment, which was a challenge for Tata Steel in the early stages.
b) Skill Gaps: There was a need for upskilling the workforce to handle advanced technologies like AI, IoT, and robotics.
c) Infrastructure Limitations: Tata Steel faced challenges in upgrading existing infrastructure to support Industry 4.0 technologies, particularly in rural and semi-urban areas.

Conclusion: Tata Steel's case demonstrates the potential of Industry 4.0 to transform the manufacturing sector in India. While the company has reaped benefits in terms of productivity and quality, it also encountered challenges related to investment and skill development. The success of Tata Steel serves as a model for other Indian manufacturers

looking to adopt Industry 4.0 technologies, but it also highlights the need for strategic planning, government support, and workforce development to overcome challenges.

This case study reflects the opportunities and challenges associated with implementing Industry 4.0 in India, as explored in Dr. Gunda Srinivas's research on the subject.

4.4 STRATEGIES

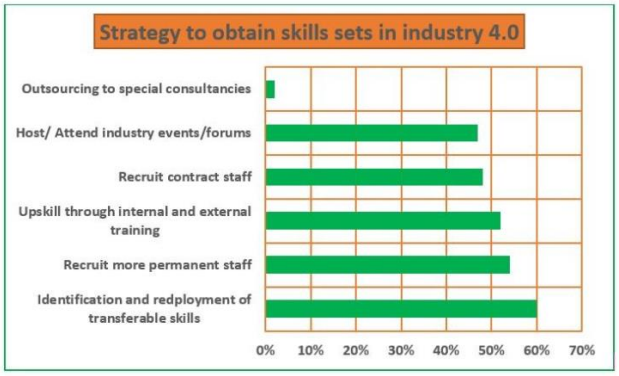
These are the strategies for industry 4.0

a) Recruitment

NEW JOB ROLES

Traditional Roles	New Roles
General and Operations Managers	AI and Machine Learning Specialists
Software and Applications Developers	Big Data Specialists
Sales and Marketing Professionals	Data Analysts and Scientists
Sales Representatives	Digital Transformation Specialists
Wholesale and manufacturing	New Technology Specialists
Technical Human Resources, Specialists Financial and Investment Advisers	Process Automation Specialists
Database and Network Professionals	Innovation Professionals
Supply Chain and Logistics Specialists	Ecommerce and social media. Specialists Robotics, Specialists and Engineers

According to new job roles to face the challenge of recruitment following strategies can be followed.

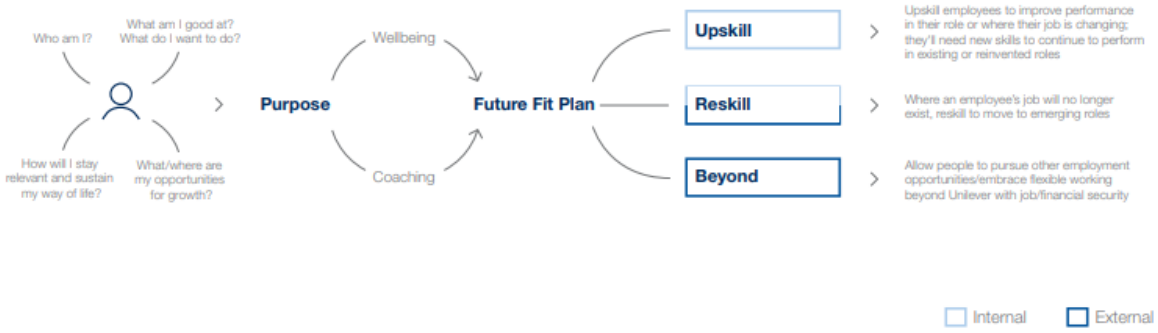


Source: The Future of Jobs Report 2018

b) Training

New report from Manpower Group, called The Skills Generation, surveyed 18,000 employers over 43 countries, to find out how technology would impact their businesses in the next couple of years. The findings provided new insights for the workforce on acquiring the right skills and adaptability. The survey indicated that 60% of organizations are investing in internal training to keep skills up-to-date, addressing potential skill gaps caused by

automation and AI. In light of these factors, human resources must evolve in response to the Fourth Industrial Revolution. To tackle the challenges of a VUCA (Volatile, Uncertain, Complex, and Ambiguous) business environment, Executive Development Associates (EDA) has identified seven key cognitive readiness skills—Mental Cognition, Attention Control, Sense Making, Intuition, Problem Solving, Adaptability, and Communication—collectively known as Paragon 7, which are essential for leaders to successfully navigate the 'new normal.'



Source - Unilever

c) Retention:

As Industry 4.0 continues to integrate, individuals must remain open-minded and proactive in their development to stay ahead in the competitive landscape. From an organizational standpoint, fostering effective communication and offering ample growth opportunities for current employees are crucial for achieving positive retention outcomes in this rapidly evolving era.

4.5 The Role of Government in Facilitating HRM 4.0 for MSMEs

The Indian government holds a crucial position in steering the MSME sector into the fold of Industry 4.0 and HRM 4.0. With MSMEs comprising a significant portion of the country's industrial landscape—approximately 60 million enterprises contributing to 45% of India's total manufacturing output—this sector is pivotal to India's economic transformation. However, MSMEs often face limitations such as insufficient funds, lack of technical expertise, and minimal exposure to advanced technologies. To address these challenges and ensure equitable access to Industry 4.0 benefits, the government must implement targeted strategies.

1. Enhancing Skills through Education and Training:

i. The government must mandate an industry-focused curriculum in vocational and higher education systems. This curriculum should prioritize skills directly relevant to

Industry 4.0 and HRM 4.0, such as digital HR systems, data analytics, and the use of AI in workforce management.

ii. Initiatives like project-based learning and interdisciplinary approaches should be integrated into undergraduate and technical education to equip students with practical, problem-solving abilities.

iii. Existing vocational training infrastructure should be modernized in collaboration with private sector partners to include components of Industry 4.0, ensuring that employees in MSMEs are prepared for technological advancements.

2. Policy Framework and Infrastructure Development:

i. Establishing Centres of Excellence (CoE's) dedicated to HRM 4.0 can serve as innovation hubs where MSMEs can access training, resources, and collaborative opportunities with larger industries.

ii. Public-Private Partnerships (PPPs) should be encouraged to develop affordable technical infrastructure and knowledge-sharing platforms.

iii. Financial incentives such as subsidies, tax benefits, and funding grants should be provided to MSMEs to make digital transformation initiatives financially viable.

3. Promoting Digitalization and Cybersecurity:

i. With the integration of IoT and data analytics in HRM 4.0, ensuring robust cybersecurity frameworks is essential. The government should develop and enforce policies to protect sensitive organizational and employee data.

ii. Strengthening telecommunications infrastructure is also crucial to support seamless adoption of IoT-based HR systems, particularly for MSMEs located in smaller towns and rural areas.

The Role of Organizations in Supporting MSMEs for HRM 4.0

Large corporations and multinational enterprises play a vital role in driving MSMEs toward successful integration into HRM 4.0. These organizations, acting as both adopters and facilitators, can extend their technological and organizational expertise to include MSMEs in the Industry 4.0 ecosystem.

1. Inclusive Supply Chain Integration:

Large organizations can encourage MSME participation by integrating them into their supply chains. By providing MSMEs with clear guidelines and fostering a collaborative environment, these smaller enterprises can better align their processes with the advanced requirements of Industry 4.0.

2. Training and Reskilling Initiatives:

Corporations can support MSMEs by offering tailored training programs and sharing advanced HRM 4.0 tools. These initiatives can help MSME employees become adept in using modern HR systems and tools like AI-powered recruitment platforms, performance management systems, and data-driven decision-making frameworks.

3. Technology Sharing:

By collaborating with MSMEs, larger enterprises can co-develop cost-effective, scalable digital solutions tailored to the unique needs of MSMEs. This approach can help smaller enterprises overcome resource constraints and adopt advanced HR practices.

Opportunities for MSMEs in HRM 4.0

1. Improved Talent Management:

i. MSMEs can leverage affordable HR analytics tools to enhance recruitment processes, employee engagement, and retention rates. These tools can provide insights into workforce trends, enabling more informed decision-making.

ii. Flexible work arrangements, such as remote and hybrid models, can attract a wider talent pool and improve job satisfaction among employees.

2. Streamlined Operations:

i. By automating repetitive HR tasks, such as payroll processing, recruitment screening, and attendance tracking, MSMEs can focus more on strategic initiatives. Automation also helps reduce human errors and operational inefficiencies.

3. Enhanced Competitiveness:

i. Adopting scalable digital HRM solutions can help MSMEs improve productivity, foster innovation, and align with larger industry trends, enabling them to remain competitive in a rapidly evolving market.

Challenges for MSMEs in Adopting HRM 4.0

1. Financial Constraints:

i. Implementing advanced HRM 4.0 technologies often requires significant initial investment. For resource-constrained MSMEs, these costs can be a major deterrent.

2. Skill Deficits:

i. A significant barrier to HRM 4.0 adoption is the lack of adequately skilled employees. MSMEs often struggle to find workers proficient in using digital tools and technologies.

3. Resistance to Change:

i. Many MSMEs operate in traditional setups and may exhibit resistance to adopting new technologies and workflows. Overcoming this inertia requires sustained efforts in change management and awareness-building.

Smart HR 4.0 Leads to Smart People 4.0

In the era of Industry 4.0, it is essential for HR to be smart and adaptable to manage the significant changes. To thrive in this environment, HR departments must transform and upgrade their capabilities.

To effectively prepare for these changes, the groundwork should include:

a) **Innovation and Growth:** Embrace new technologies and strategies to drive continuous improvement.

b) **Skill and Leadership Gap Identification:** Pinpoint areas where skills and leadership are lacking and address them.

c) **Resistance and Barrier Identification:** Recognize and tackle obstacles and resistance to change.

d) **Future Goal Setting:** Define clear, specific objectives for the future.

Benefits of Adopting Smart HR 4.0:

a) **Streamlined HR Departments:** Achieve a more efficient and leaner HR structure.

b) **Enhanced HR Operations:** Experience faster and more efficient HR processes.

c) **Talent Management:** Attract, develop, and retain top talent more effectively.

5. CONCLUSION

In summary, the incorporation of Industry 4.0 into Human Resource Management (HRM), commonly known as HRM 4.0 or Smart HR 4.0, offers substantial opportunities and challenges for contemporary organizations. The rise of digitalization, automation, and data-driven decision-making has transformed traditional HR functions, creating an environment where adaptability and continuous learning are essential.

The opportunities include enhancing employee experiences, optimizing talent management, and leveraging big data for strategic workforce planning. Automation and advanced technologies such as AI and VR are streamlining processes, while remote and flexible work environments are becoming more prevalent. These advancements allow organizations to offer personalized and efficient services, thereby improving employee satisfaction and retention.

However, notable challenges also exist. Organizations struggle with recruiting and retaining skilled talent, especially in technical fields. The move towards digitalization requires significant investment in training and upskilling to prepare the workforce for new job roles. Additionally, the rapid pace of change can lead to resistance, necessitating that HR departments cultivate a culture of adaptability and continuous improvement.

Empowering MSMEs through HRM 4.0 with government and industry support will boost innovation, address challenges, and enhance competitiveness, driving sustainable growth in India's Industry 4.0 journey.

To address these complexities, organizations must focus on developing a digital culture, embracing innovative recruitment and retention strategies, and prioritizing employee well-being. The success of HRM 4.0 hinges on the proactive adaptation of HR practices to meet the demands of the digital age, ensuring that companies not only survive but thrive in this era of rapid technological transformation. By doing so, organizations can achieve leaner HR departments, more efficient operations, and a competitive edge in attracting and retaining top talent.

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