The Effects of the Fourth Industrial Revolution on Human Resource Management

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By

Shobha Bhardwaj and Kanishkaa Tiwari

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PREFACE

Our HR 4.0 theme-based book encompasses the plethora of information about the impact of industrial revolution 4.0 on the HRM domain. The content covered in this book gives readers a thorough knowledge of the many technological breakthroughs that are upending traditional workplace practices. It sheds light on major ideas such as Industry 4.0, HR 4.0, Artificial Intelligence, and glances towards HR 5.0, providing readers with vital insights.

This book will help especially HR professionals, experts, college professors, students, and those who want to enhance or update their knowledge from time to time in the HR domain. After reading this book, company executives or HR managers can adopt and apply the new technology to sort out their daily manpower and work efficiency related issues in a proficient manner.

This book is an application-based book in that we have covered the applicability of industry 4.0 in different sectors, the challenges faced while implementing it, as well as solutions to be adopted. Not only this but we have also covered what perception people and industrial leaders have about AI and Industry 4.0 worldwide. Thus, this book provides a global outlook of Industry 4.0.

In addition, we have posed a question to all of you on the future emergence of Industry 5.0. We've detailed the key assumptions that industry professionals have concerning the sector's future progress.

Finally, the author's viewpoint and essential concepts are presented. The book is widely anticipated, so don't lose out on the chance to journey from HR 4.0 to 5.0 and receive insight into the innovative uses of Artificial Intelligence (AI).

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Dr. Shobha Bhardwaj is working as an Assistant Professor at the Department of Management, Institute of Management Studies Ghaziabad (University Courses Campus), Ghaziabad, India. She has been awarded a Ph.D. in HR Specialization in 2021. She has also qualified University Grants Commission-National Eligibility test (UGC-NET) in the year 2019 in specialization of Labour Welfare, Personnel Management, Industrial Relations, Labour and Social Welfare and Human Resource Management. She has published many research papers and chapters in Scopus and UGC-listed national and international journals in the area of HR and General Management. Also, she has presented numerous papers at various national and international conferences. She has teaching and industry experience of more than eight years. Her areas of interest include Employee Psychology, Emotional Intelligence, Competency Mapping, Talent Management, Organization Behaviour, Employee Relation and Welfare.

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ABSTRACT

This book "**The Effects of the Fourth Industrial Revolution on Human Resource Management**" represents a paradigm shift in the digital age by integrating ethical values and environmental responsibilities with technology breakthroughs. Industry 4.0 has a significant impact on HR, simplifying processes while posing problems like job displacement and concerns about technology adaption. Data analytics, AI-driven hiring, and remote work cultures are reshaping HR procedures, but responsible implementation and ethical concerns are still essential. AI poses ethical difficulties like biases and privacy concerns, necessitating careful navigation while automating tasks and delivering insights. Along with crucial qualities like communication skills, adaptability, and strategic vision, HR professionals also need to be technically proficient in AI applications and data security standards. Employees must be capable of ongoing learning and flexibility as part of Industry 4.0, which can be supported by training programmes and encouraging employee development.

Innovative solutions are used to address issues such as a lack of competence and data security concerns in the constantly changing world of HR 4.0/5.0. Businesses emphasise staff upskilling, building a tech-friendly culture, and coordinating HR strategies with business objectives. Leadership in HR 5.0 necessitates flexibility in order to strike a balance between technological innovation and human-cantered strategies. The importance of ethical considerations necessitates open communication, just AI algorithms, and ethical data management. Emphasis is placed on the collaborative synergy between humans and AI, demonstrating AI as a tool augmenting rather than completely replacing human talents.

The cornerstone of HR 4.0/5.0 is ethical and sustainable HRM practices, emphasising environmentally friendly digital transformation and carbon-neutral workplaces. Sustainable recruitment practices reduce the negative effects on the environment, while ethical leadership fosters a culture of responsibility and social accountability. A circular economy is aided by circular HR practices that reduce waste and encourage reuse. Collaboration in CSR highlights the industry's knowledge of its social and environmental impact and promotes an HR environment that is socially and environmentally conscientious.

In conclusion, the incorporation of ethics and environmental awareness into HRM is more than simply a vision—it is an obligation. Organisations can become conscientious contributors to a better society thanks to HR 4.0/5.0. HR professionals help to create a future in which the symbiotic relationship between people, the environment, and progress results in a sustainable, just, and peaceful society for future generations. They do this by encouraging ethical leadership, adopting green technologies, and advocating social responsibility.

CHAPTER 1

INTRODUCTION TO INDUSTRY 4.0

This book investigates the tremendous impact of technological breakthroughs on contemporary HRM concepts and practices in a variety of businesses. It delves deeply into the topics of the Fourth Industrial Revolution, HR 4.0, and the role of Artificial Intelligence in HRM. Furthermore, it investigates the potential ramifications of the continuing progression from HR 4.0 to HR 5.0.

1.1 About Industrial Revolution 4.0

Figure 1.1: Industry 4.0 working [1]

> *"The general definition of Industry 4.0 is the rise of digital industrial technology ... Industry 4.0 transformations allow us to work alongside machines in new, highly productive ways."*
>
> **—Daniel Burrus**

This term 4.0 was firstly coined by Germany in 2011 with reference to the industry revolution.

Through the use of smart technology, Industry 4.0 technologies revolutionize the automation, monitoring, and analysis of supply networks.

There have been three industrial revolutions since the 1800s. Each was propelled by a revolutionary new technology: the assembly line's ingenuity,

the steam engine's physics, and the computer's speed. They were referred to as industrial "revolutions" because the invention behind them significantly transformed how goods were produced and how work was done, not merely slightly enhancing productivity and efficiency.

We are currently experiencing the Fourth Industrial Revolution, also known as Industry 4.0, which uses smart technologies to revolutionize the automation, monitoring, and analysis of supply chains. Industry 4.0 relies on smart technology like the Industrial Internet of Things (IIoT) and cyber-physical systems. These systems use clever computer programs to watch over and manage things like machines, robots, and vehicles. Everything in your supply chain becomes "smart" according to Industry 4.0, from smart factories and manufacturing facilities to smart storage and logistics. However, Industry 4.0 goes beyond the supply chain. Enterprise resource planning (ERP) and other back-end systems are interconnected to provide businesses with a level of visibility and control never before possible. Industry 4.0 is ultimately a key component of any company's digital transition.

1.2 Nine Pillars of Industry 4.0

Nine technological pillars form the foundation of Industry 4.0. These developments allow for the creation of intelligent and autonomous systems by bridging the physical and digital realms. Some of these cutting-edge technologies are currently used by businesses and supply chains, but when they're combined, Industry 4.0's full potential is realized.

They are Big Data and analytics, horizontal and vertical integration, augmented reality, cloud computing, Industrial Internet of Things (IIOT), additive manufacturing/3d printing, autonomous robots, simulation/digital twins, and cyber security.

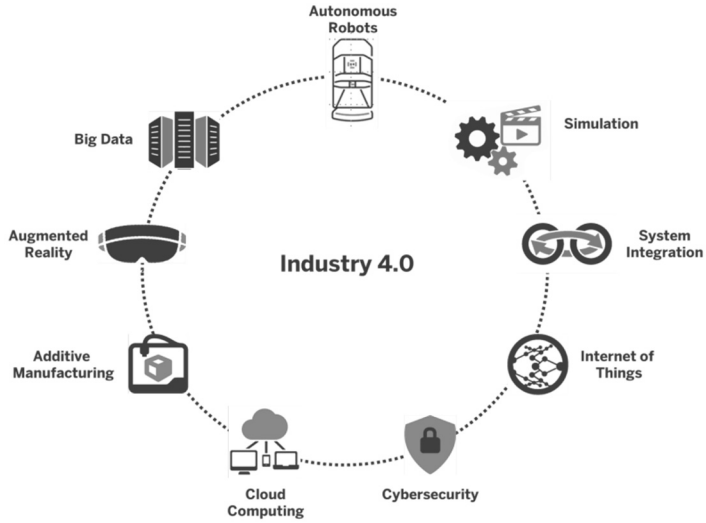

Figure 1.2: Nine Pillars of Industry 4.0 [2]

1.3 Benefits of Industry 4.0

A wide range of Industry 4.0 solutions are available in the market, assisting thousands of businesses in reimagining manufacturing, putting the customer first, and connecting their entire organization.

Here are some advantages that businesses are noticing [3]:

- Significant increases in automation and productivity: Businesses are using data-driven decisions to improve forecast accuracy, enable on-time delivery, and create profit-optimized plans across all aspects of their operations.
- Resilience and agility, no matter what the market or economy brings: Companies are utilizing cutting-edge planning to shape the digital supply chain of the future.
- Confidence to investigate novel business concepts and act promptly on opportunities: Businesses are saving money, increasing market effectiveness, and integrating supply chains by sea, land, and air thanks to Industry 4.0 solutions.
- Solutions that are environmentally friendly and profitable: Going digital helps consumers become more productive and cost-effective

while still achieving their environmental goals without sacrificing other corporate objectives like profitability and scalability.

1.4 Industry 4.0 in Different Sectors

1. Healthcare Sector

A recently established idea called "Health 4.0" is derived from Industry 4.0, which denotes the fourth manufacturing revolution. In the end, the idea revolves around intelligent machines that have access to vast amounts of data and can thus make decisions independently of humans. When it comes to Health 4.0, it makes reference to a variety of potential uses for Industry 4.0 technologies to enhance healthcare as it outlines a fresh and avant-garde vision for the industry. The goal is to improve the efficacy and efficiency of the healthcare sector while also offering patients better, more valuable, and more affordable healthcare services.

One of the industries where the 4.0 revolution is expected to produce outstanding outcomes is healthcare. Compared to earlier decades, today's sector is increasingly computerized, with x-rays and magnetic resonance imaging making way for computed tomography, ultrasound scans, and electronic medical records. Healthcare 4.0 significantly improves the quality, flexibility, productivity, cost-effectiveness, and dependability of healthcare services as it improves the patient experience. Medical Cyber-Physical Systems, the Internet of Health Things, health clouds, health fogs, big data analytics, machine learning, blockchain, and intelligent algorithms are all combined and employed. [4]

Figure 1.3: AI in Healthcare sector [5]

2. Manufacturing Sector

Although the term "Industry 4.0" may make tycoon games like SimCity sound appealing, it represents the biggest change in global production since automation.

Industry 4.0 accelerates company operations by fusing manufacturing and IT technologies, such as the Internet of Things, artificial intelligence and machine learning, mixed reality, and 3D printing.

Adopting Industry 4.0 tools can streamline the recordkeeping process and improve a company's competitiveness, productivity, and profitability.

During the COVID-19 epidemic, businesses who have embraced Industry 4.0 practices fared better.

This essay is intended for proprietors of small businesses who are curious in how Industry 4.0 enhances business operations both within and outside the manufacturing sector.

Industry 4.0 is modernizing production and enhancing the competitiveness of the western industrial sector. It is centred on improved robotics and automation, new forms of human-machine interaction, massive troves of data, and increasing connectivity. [6]

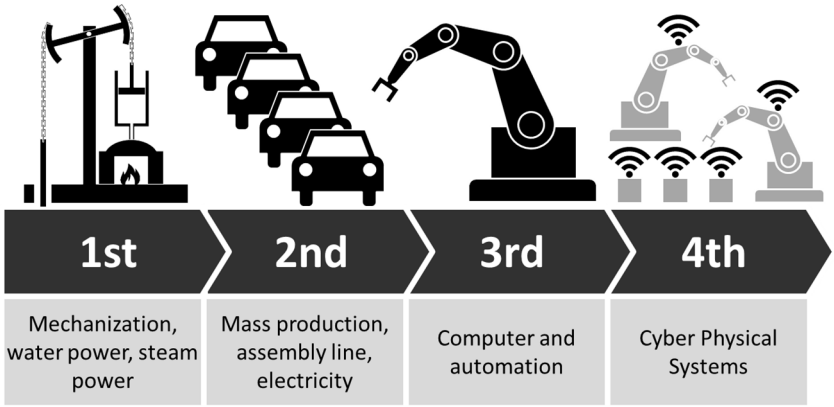

Figure 1.4: AI in the Manufacturing Sector [7]

3. Agriculture Sector

Industry 4.0 has had a big impact on agriculture. Agriculture and Industry 4.0 are actually closely related. Agriculture 4.0 is a new idea that has emerged as a result of the use of modern Industry 4.0 applications in farming. Agriculture 4.0 is a farming management system that uses new technologies and gathers useful data to raise production and boost efficiency.

Farmers can monitor crops, adjust planting, and reduce production costs using cutting-edge tools and automated management systems. Advanced technologies are available that enable the farmer to drill down and comprehend the quantity of resources (such as irrigation, fertilizer, and pesticides) needed in each area of the farm. Let's look at the Industry 4.0 applications utilized in agriculture in order to comprehend the impact of this technology on this sector.

Agriculture 4.0 provides farmers with data-driven insights to combat dwindling resources, pests, and changing weather conditions. This includes better cost management, waste reduction, and smaller carbon footprint. Digital technologies have led to a 30% reduction in the use of water, fuel, fertilizers, and herbicides, and more precise management has also minimized the use of pesticides. Additionally, the ability to better predict crop needs facilitates higher yields and reduces the waste of resources [8].

Figure 1.5: AI in the Agriculture Sector [9]

4. Human Resources Sector

The fourth great Industrial Revolution, also known as "Industry 4.0," and the notion of HR 4.0 are closely related.

Industry 4.0 has changed how businesses approach manufacturing significantly, but it has also reduced the need for Human Resources, particularly through automation. Similar to this, the efficiency and effectiveness of decision-making procedures related to people management have significantly risen as a result of data sharing between various platforms.

Although the world will undergo even more change in the years to come, much of the technology required to replace the majority of the existing HR-related functions is already in place.

As a result, HR 4.0 represents a revolution in the field of human resources. It automates HR, allowing it to concentrate on strategic challenges rather than manual, bureaucratic, and repetitive tasks.

Both the development of tools by the IT sector and the increased demands made by the government regarding labour relations are examples of this movement. Remember how HR departments were forced to integrate technology into routines that were hardly ever done with paper documents before the emergence of responsibilities like eSocial? [10]

Figure 1.6: AI in Human Resource Sector [11]

1.5 Revolutionizing HR: The Impact of Industry 4.0

Industry 4.0 has emerged as a transformative force across numerous sectors in the fast-paced landscape of technological breakthroughs. Human Resources (HR) is one of the domains undergoing a major transformation. The old HR framework is being rewritten as organizations adjust to the needs of the fourth industrial revolution, resulting in a paradigm shift in how firms manage their employees.

The incorporation of modern technologies such as artificial intelligence (AI), machine learning, automation, and data analytics into HR practices is at the heart of this revolution. These technologies enable HR professionals to streamline and improve different parts of their roles, resulting in greater efficiency and decision-making.

Recruitment and talent acquisition, for example, have seen significant transformations. AI-powered algorithms are increasingly assisting HR departments in identifying and matching individuals to job criteria, minimizing manual labour and bias. Similarly, virtual reality (VR) and augmented reality (AR) experiences are revolutionizing employee onboarding and training, creating immersive learning environments that enhance engagement and retention.

Furthermore, Industry 4.0 has accelerated the rise of remote employment and flexible working arrangements. Cloud-based HR systems, collaboration tools, and communication platforms enable seamless remote work experiences, allowing employees to have greater control over their schedules while still remaining productive.

However, as HR embraces the benefits presented by Industry 4.0, new obstacles develop. Data privacy and ethical implications around AI-driven choices necessitate cautious manoeuvring. Furthermore, HR personnel must be trained to operate and capitalize on the possibilities of these new technologies.

Finally, the current HR revolution fuelled by Industry 4.0 is altering how businesses manage their most precious asset - their employees. HR professionals are ushering in a new era of efficiency, engagement, and strategic decision-making by embracing innovative technologies. The influence of Industry 4.0 on HR is more than just technology advancement; it is a fundamental shift that enables organizations to optimize their human capital for an uncertain future.

The implementation of IR 4.0 has resulted in the most recent HR reforms and innovations:

Industry 4.0 has resulted in substantial HR reforms and innovations, altering how organizations manage their workforce and promoting improved efficiency, engagement, and strategic decision-making. Some of the most recent HR reforms and improvements as a result of Industry 4.0 include:

1. *AI-Driven Recruitment and Selection*: Industry 4.0 has resulted in the creation of sophisticated AI algorithms capable of analyzing résumés, assessing candidate appropriateness, and even conducting preliminary interviews via chatbots. These technologies aid in the recruitment process by saving time and resources and assuring more precise applicant matching.
2. *Data-Backed Decision-Making:* Organizations can now make more informed decisions about workforce planning, performance management, and employee engagement thanks to the amount of data supplied by various HR platforms. HR professionals can use advanced analytics tools to discover patterns, predict attrition, and handle issues before they become problems.

3. *Personalized Learning and Development*: Industry 4.0 has made it possible for employees to follow personalized learning paths. AI-powered systems may assess employees' skills and performance and provide customized training courses to help them improve their capabilities and accomplish organizational goals.
4. *Remote Work and Flexibility*: With the emergence of Industry 4.0, the adoption of remote work and flexible arrangements has accelerated. Remote communication, collaboration, and performance management are made possible by cloud-based HR systems and digital collaboration technologies.
5. *Virtual Reality (VR) and Augmented Reality (AR) Training*: Immersive training experiences are being created using VR and AR technology. Employees can receive hands-on training and new hires can be trained-up remotely, resulting in higher engagement and retention.
6. *Employee Self-Service and Chatbots*: HR chatbots give employees immediate answers to frequent questions and can aid with managing tasks such as leave applications, benefits enrollment, and policy information. This decreases the administrative burden on HR professionals while also empowering employees to obtain information on their own.
7. *Feedback and Performance Analytics*: Real-time performance analytics technologies offer ongoing feedback and coaching. Managers can improve individual and team performance by monitoring employee performance measures, providing timely feedback, and providing development opportunities.
8. *Predictive Analytics for Employee Retention*: With Industry 4.0, HR managers may use predictive analytics to identify characteristics that contribute to employee turnover. Organizations can develop measures to retain prized talent by analyzing historical data and patterns.
9. *Emphasis on Soft Skills*: As automation and artificial intelligence become more common, the value of soft skills such as creativity, emotional intelligence, and flexibility has grown. HR is working on assessing and improving these abilities in employees in order to keep them competitive in a changing job market.
10. *Workforce Diversity and Inclusion*: As a result of Industry 4.0, HR is putting a larger emphasis on diversity and inclusion programs. Advanced analytics can assist with uncovering areas for development, and technologies like blind hiring can help decrease hiring prejudice.

Finally, the incorporation of Industry 4.0 technology into the HR sector has resulted in a slew of reforms and innovations that improve the way businesses manage and engage their personnel. These developments are not only changing HR practices, but they are also contributing to organizations' overall success and agility in an era of rapid technological advancement.

CHAPTER 2

THE IMPACT OF INDUSTRY 4.0 ON HR CONCEPTS AND THE WORKFORCE

The fourth industrial revolution, known as Industry 4.0, has given rise to a slew of HR technologies such as the Internet of Things (IoT), Cloud computing, virtual reality, Artificial Intelligence, and others. However, the applicability of these technologies, as well as their capacity to maximize earnings while ensuring zero errors, vary for each company. It is critical to recognize that not all technologies are relevant across industries. Technology adoption and selection are critical decisions for managers since they must align with their work culture and optimize production.

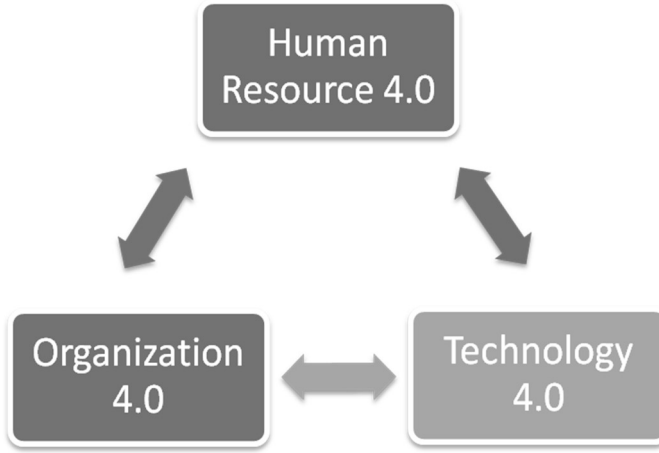

Figure 2.1: IR 4.0 impact [12]

HR functions now have a plethora of options thanks to Industry 4.0. The Internet of Things enables interconnected devices and sensors to collect and share data, resulting in more efficient and accurate human resource procedures. Cloud computing provides scalable storage and computational

capacity, making HR data and apps accessible from any place. Virtual reality can be used to enhance employee learning experiences through immersive training and development programs. Automation and data analysis enabled by artificial intelligence optimize HR processes like recruitment, performance appraisal, and staff planning.

However, it's important to acknowledge that not every technology is universally suitable for every industry. The adoption and implementation of these technologies should be tailored to the specific needs and requirements of each company. Factors such as the nature of the industry, organizational culture, workforce demographics, and budgetary considerations need to be taken into account. Managers play a critical role in assessing the compatibility of technologies with their work culture and identifying which solutions will best optimize production and drive profitability.

Companies may embrace the potential of Industry 4.0 to alter their HR operations by carefully examining existing technologies and picking the most appropriate ones. The goal is to use technology to reduce errors, streamline operations, improve decision-making through data analysis, and ultimately promote corporate success.

The application of technical breakthroughs, notably AI, in the field of human resources has resulted in a number of favourable outcomes. These advantages stem from insights acquired from experts and industry professionals who have already begun implementation and are reaping the benefits of these changes.

2.1 Positive Practical Perspectives

· *The potential for HR 4.0 to improve efficiency and production extends not only to HR departments, but also to a company's complete operations.*

Adoption of AI or any other technology improvement in the HR department extends beyond the growth and development of HR staff. The HR department, as the central department dealing with personnel, has the power to influence and improve the efficiency of all employees and department heads throughout the organization.

· *It can help to attract and retain top talent by providing a more personalized and engaging employee experience.*

HR organizations can easily manage a database to predict future hiring demands by utilizing an Applicant Tracking System (ATS), an e-Recruitment technology. This program enables managers to operate intelligently rather than depending on antiquated HR approaches such as reaching out to candidates only when immediate needs occur. HR may also efficiently monitor and analyse employee performance through direct supervision by deploying a Performance Management solution. This application is extremely useful for tracking employee performance, determining training requirements, and performing performance evaluations.

· *It can help to make HR decisions more data-driven and objective.*

In the age of HR 4.0, there is an increasing emphasis on making data-driven and objective HR choices. This means that instead of depending entirely on subjective variables or personal opinions, HR professionals are relying on data and analytics to inform their decision-making processes. Organizations may decrease biases, assure fairness and transparency, and match their plans with measurable outcomes by making HR decisions more data-driven and objective. However, while data can provide helpful insights, it must be supplemented with human judgment and consideration of individual circumstances in order to create well-rounded and effective HR decisions.

· *It can help to create a more agile and adaptable workforce that is better prepared for the challenges of the future.*

It is the manager's obligation to develop a staff that welcomes change willingly and naturally, without pressure or imposition. Employees with attributes like inventiveness, optimism, and a willingness to embrace new changes, such as technology adoption, continuously improve their abilities and contribute to their organization's pursuit of higher levels of success and growth.

Employees develop the skills and mentality required to manage the ever-changing world of technology and business through automation, continuous learning, flexibility, problem-solving, and cooperation, positioning themselves and their organizations for long-term success.

2.2 Negative Perspectives

Figure 2.2: Negative aspects of technological advancement

· *HR4.0 could lead to job losses in HR departments as some tasks are automated.*

It is true that workplace automation has the potential to change the way businesses run. In some cases, AI technology can be used to replace and manage employee employment. As a result, it is critical for the workforce participating in Industrial Revolution 4.0 (IR 4.0) to constantly upgrade their abilities and keep up with technological breakthroughs. They must proactively improve their knowledge, build new capabilities, and gain the essential skills to properly manage the obstacles offered by technological improvements, avoiding obsolescence issues.

· *It could create a divide between employees who are comfortable with technology and those who are not.*

Following the implementation of these technologies, workplace changes frequently result in the separation of personnel into two distinct categories. The first group consists of those who are open to new challenges and approaches to problems. Employees in the second category are resistant to working with technology and generally avoid learning new things. Because of a lack of awareness, such individuals tend to reject change and oppose any technological advances in the workplace. In such cases,

managers must take on a leadership position that emphasizes motivation and preserving balance, rather than taking an autocratic approach. Workplace renovations can sometimes result in the alienation of employees who struggle with technology adoption. It is critical to acknowledge that these employees may still have talent and are valuable to the organization. Their challenge, though, is in accepting any type of change, regardless of its prospective benefits.

· *It could lead to a loss of human connection in the workplace.*

The shift to remote work or working from home has the ability to change employees' mindsets and their personal connection to their firm. Engaging in freelance work can often result in a disconnection from the firm as a close-knit family, resulting in a diminished sense of connection. The following impacts have been generally noticed following the incorporation of technology:

i. Decreased Face-to-Face Interaction
ii. Reduced Social Bonds
iii. Focus on Task-Oriented Work
iv. Decreased Empathy and Emotional Connection
v. Isolation and Alienation

Organizations can take proactive measures to mitigate the potential loss of personal connection. This involves encouraging regular face-to-face communication, boosting teamwork and collaboration, and creating opportunities for employees to engage on a personal level. It is critical to maintain a healthy and engaging work environment by balancing the benefits of AI and technology with the significance of human interaction.

· *It could be difficult to implement HR 4.0 effectively, especially in large organizations.*

HR 4.0 implementation can be difficult, especially in large organizations. Here's some more information on the subject:

1. Change Resistance: Implementing HR 4.0 initiatives frequently necessitates a considerable transformation in organizational culture and practices. Employees who are accustomed to old HR practices may be sceptical or unwilling to embrace new technology or approaches, which can lead to resistance to change. Overcoming this opposition and getting support from employees at all levels of the organization can be difficult.