Future-Ready HR Professionals: Redesigning Management Education for Industry 5.0.

Abstract

The transition from Industry 4.0 to Industry 5.0 signifies a fundamental shift from technology-driven efficiency to a more human-centric, sustainable, and resilient industrial paradigm. This transformation redefines the role of Human Resource (HR) professionals as strategic enablers of human–machine collaboration, ethical governance, and workforce well-being. However, existing management education systems remain predominantly aligned with Industry 4.0 frameworks, focusing on automation, analytics, and operational efficiency, thereby creating a gap between academic preparation and industry expectations.

This paper explores the need to redesign management education to develop future-ready HR professionals capable of thriving in Industry 5.0 environments. Adopting a conceptual and literature-based approach, the study identifies emerging competency requirements, including digital fluency, emotional intelligence, sustainability orientation, and strategic thinking. It further examines critical gaps in current curricula, such as limited interdisciplinary integration, inadequate industry exposure, and insufficient emphasis on experiential learning and ethical dimensions.

To address these challenges, the paper proposes an integrative framework—the HUMAN-TECH HR Model—which emphasizes human-centric learning, multidisciplinary integration, technology-enabled pedagogy, and continuous skill development. The framework advocates a shift toward experiential and flexible learning systems supported by strong industry–academia collaboration.

The study contributes to the growing discourse on the future of work by aligning HR education with Industry 5.0 principles and offers practical implications for academic institutions, policymakers, and organizations seeking to build a resilient and future-ready workforce.

Keywords:
Industry 5.0; Human Resource Management (HRM); HR Education; Future of Work; Human-Centricity; HR Competencies; Management Education; Sustainability; People Analytics; Experiential Learning

1. Introduction

The evolution of industrial paradigms has consistently reshaped organizational structures, workforce expectations, and managerial practices. The transition from Industry 4.0 to Industry

5.0 marks a critical inflection point, shifting the focus from pure technological advancement and automation to a more balanced integration of human intelligence and machine capabilities. Unlike its predecessor, Industry 5.0 emphasizes human-centricity, sustainability, and resilience, positioning humans not as mere operators of technology but as co-creators of value alongside intelligent systems.

In this evolving landscape, Human Resource Management (HRM) assumes a pivotal strategic role. HR professionals are increasingly expected to facilitate human–machine collaboration, foster inclusive and ethical workplaces, and ensure continuous workforce adaptability in the face of rapid technological disruptions. This shift demands a reorientation of HR competencies from traditional administrative functions toward strategic, analytical, and human-centric capabilities.

However, the current management education ecosystem, particularly in emerging economies like India, continues to be largely aligned with Industry 4.0 priorities. The emphasis remains on operational efficiency, standard HR practices, and limited integration of digital and ethical dimensions. This misalignment creates a competency gap between industry expectations and graduate readiness. Therefore, it becomes imperative to redesign management education frameworks to cultivate future-ready HR professionals equipped to thrive in Industry 5.0 environments.

2. Conceptual Understanding of Industry 5.0

2.1 Evolution from Industry 4.0 to Industry 5.0

Industry 4.0 revolutionized organizations through automation, artificial intelligence, big data analytics, and cyber-physical systems, significantly enhancing efficiency and productivity. However, it also raised concerns related to job displacement, reduced human agency, and ethical dilemmas associated with technology-driven decision-making.

Industry 5.0 emerges as a response to these limitations by advocating a more balanced and inclusive approach. It reintroduces the human element into the technological ecosystem, emphasizing collaboration rather than substitution. The focus extends beyond economic value creation to include social well-being and environmental sustainability. Organizations are encouraged to design systems where human creativity, critical thinking, and emotional intelligence complement technological precision and scalability.

2.2 Core Pillars of Industry 5.0

The conceptual foundation of Industry 5.0 rests on three interrelated pillars:

- **Human-Centricity:**
  This pillar prioritizes employee well-being, meaningful work, and empowerment. It recognizes that organizational success is intrinsically linked to the satisfaction, engagement, and development of its workforce.

- **Sustainability:**
  Industry 5.0 aligns business objectives with environmental and social responsibilities. Organizations are expected to adopt sustainable practices, reduce ecological footprints, and contribute to long-term societal well-being.
- **Resilience:**
  In an era of uncertainty and disruption, resilience becomes a critical organizational capability. Industry 5.0 promotes adaptive systems capable of responding effectively to crises, technological shifts, and market volatility.

3. Changing Role of HR in Industry 5.0

The transformation toward Industry 5.0 necessitates a fundamental redefinition of the HR function. HR professionals are no longer confined to administrative roles but are increasingly recognized as strategic partners contributing to organizational agility and innovation.

- **From Administrative to Strategic Role:**
  HR is evolving into a key driver of organizational strategy, actively participating in decision-making processes related to talent management, culture building, and digital transformation.
- **Designing Human–Machine Collaboration:**
  A critical responsibility of HR is to ensure seamless integration between human capabilities and technological systems. This involves designing workflows, redefining job roles, and managing change to facilitate effective collaboration.
- **Focus on Employee Experience and Well-being:**
  Industry 5.0 places significant emphasis on employee experience, mental health, and psychological safety. HR must create supportive work environments that enhance engagement and productivity.
- **Data-Driven HR (People Analytics):**
  The adoption of analytics enables HR to make evidence-based decisions related to recruitment, performance management, and employee retention. Predictive analytics further enhances workforce planning.
- **Continuous Learning and Skill Development:**
  HR plays a crucial role in fostering a culture of lifelong learning by implementing reskilling and upskilling initiatives aligned with evolving industry requirements.

4. Skills Required for Future-Ready HR Professionals

The competencies required in Industry 5.0 extend beyond traditional HR skills, encompassing a holistic blend of technological, cognitive, and interpersonal capabilities.

4.1 Digital and Technological Skills

Future HR professionals must possess a strong understanding of digital tools and platforms, including artificial intelligence, machine learning, and HR analytics. Proficiency in HR information systems and digital collaboration tools is essential for managing modern workplaces.

4.2 Human-Centric Skills

Despite technological advancements, human skills remain indispensable. Emotional intelligence, empathy, ethical judgment, and effective communication are critical for managing diverse and dynamic workforces.

4.3 Cognitive and Strategic Skills

Industry 5.0 demands higher-order thinking abilities such as critical analysis, problem-solving, and systems thinking. HR professionals must be capable of understanding complex organizational dynamics and formulating strategic interventions.

4.4 Sustainability and Ethical Competence

An increased focus on sustainability and ethics requires HR professionals to integrate ESG principles into organizational practices. This includes promoting diversity, equity, inclusion, and responsible use of technology.

5. Gaps in Current Management Education

Despite the evolving demands of Industry 5.0, management education continues to face several structural and pedagogical limitations.

- **Outdated Curriculum:**
  Many programs still emphasize traditional HR functions such as payroll, recruitment, and compliance, with limited focus on emerging competencies like analytics and sustainability.
- **Lack of Interdisciplinary Learning:**
  There is insufficient integration of disciplines such as technology, behavioral science, and environmental studies, which are essential for holistic HR education.
- **Limited Industry Exposure:**
  Students often lack practical exposure to real-world challenges, resulting in a gap between theoretical knowledge and practical application.
- **Insufficient Focus on Soft Skills and Ethics:**
  While technical skills are emphasized, soft skills and ethical considerations are often underrepresented in the curriculum.
- **Minimal Use of Emerging Technologies:**
  The adoption of advanced teaching tools such as simulations, AI-based learning platforms, and virtual reality remains limited.

6. Redesigning Management Education for Industry 5.0

6.1 Curriculum Transformation

A comprehensive curriculum redesign is essential to incorporate emerging topics such as HR analytics, artificial intelligence, sustainability, and human–machine collaboration. Courses should be dynamic and regularly updated to reflect industry trends.

6.2 Experiential and Practice-Based Learning

Experiential learning approaches, including live projects, internships, simulations, and case studies, enable students to apply theoretical concepts in real-world contexts, enhancing their practical competencies.

6.3 Interdisciplinary Approach

Integrating knowledge from multiple disciplines fosters a holistic understanding of complex organizational challenges. Collaboration between departments such as HR, IT, and psychology can enrich the learning experience.

6.4 Industry-Academia Collaboration

Strong partnerships between academic institutions and industry players are crucial for aligning education with market needs. Co-designed curricula, guest lectures, and mentorship programs can bridge the gap between theory and practice.

6.5 Lifelong Learning and Micro-Credentials

The dynamic nature of Industry 5.0 necessitates continuous learning. Institutions should offer flexible learning pathways, including micro-credentials and certification programs, to support ongoing skill development.

7. Proposed Framework for Future-Ready HR Education

The **"HUMAN-TECH HR MODEL"** provides a comprehensive framework for aligning HR education with Industry 5.0 requirements:

- **Human-Centric Learning:** Emphasizes empathy, ethics, and employee well-being
- **Upskilling & Reskilling:** Promotes continuous learning and adaptability
- **Multidisciplinary Integration:** Combines HR with technology and analytics
- **Agile Pedagogy:** Encourages flexible and adaptive teaching methods

- **Networked Industry Collaboration:** Strengthens academia-industry partnerships
- **Technology Integration:** Incorporates AI, simulations, and digital tools
- **Experiential Learning:** Focuses on real-world problem-solving
- **Continuous Assessment:** Moves beyond traditional exams to skill-based evaluation
- **Holistic Development:** Develops cognitive, emotional, and social competencies

This model serves as a strategic blueprint for institutions aiming to produce industry-ready HR professionals.

8. Implications

For Academia

Educational institutions must proactively redesign curricula, invest in digital infrastructure, and adopt innovative pedagogical approaches to remain relevant in the Industry 5.0 era.

For Industry

Organizations should actively collaborate with academic institutions to co-create talent pipelines, provide practical learning opportunities, and ensure alignment between education and industry requirements.

For Policymakers

Policy interventions are needed to promote skill-based education, encourage public-private partnerships, and establish frameworks that support continuous learning and innovation.

9. Conclusion

Industry 5.0 represents a transformative shift toward a more inclusive, sustainable, and human-centric future of work. In this paradigm, HR professionals play a crucial role in aligning technological advancements with human values, ensuring that organizational growth is both sustainable and equitable.

However, the existing management education system is not fully equipped to meet these emerging demands. A comprehensive redesign is necessary to bridge the gap between academic preparation and industry expectations. By integrating technological competencies, human-centric skills, and experiential learning approaches, institutions can develop future-ready HR professionals capable of navigating the complexities of Industry 5.0.

The proposed HUMAN-TECH HR Model offers a structured pathway for achieving this transformation, contributing to both academic scholarship and practical implementation. Future research may focus on empirical validation of the framework and its impact on employability outcomes and organizational effectiveness.

10. References

1. Adisa, T. A. (Ed.). (2024). *HRM 5.0: Unpacking the digitalisation of human resource management*. Palgrave Macmillan.
   This book provides comprehensive insights into AI-driven HR practices, employee well-being, and digital transformation in HRM.
2. Aydin, E., Rahman, M., & Ozeren, E. (2023). Does Industry 5.0 reproduce gender (in)equalities at organisations? Understanding the interaction of human resources and software development teams. *Information Systems Frontiers*.
   This study explores inclusivity and inequality concerns in Industry 5.0 workplaces, highlighting HR's role in equitable workforce design.
3. Breque, M., De Nul, L., & Petridis, A. (2021). *Industry 5.0: Towards a sustainable, human-centric and resilient European industry*. European Commission.
   A foundational policy document introducing Industry 5.0's three core pillars—human-centricity, sustainability, and resilience.
4. Espinal Maya, C. (2026). From automation to augmentation: A framework for designing human-centric work environments in Society 5.0. *arXiv preprint*.
   This paper highlights workplace design and human-AI collaboration as central to achieving Industry 5.0 outcomes.
5. European Commission. (2021). *Industry 5.0: A transformative vision for Europe*.
   Provides strategic direction for aligning technological progress with societal and environmental goals.
6. Movahed, A. B., Nozari, H., & Movahed, A. M. (2025). Systematic review of smart factories production in Industry 5.0. *arXiv preprint*.
   Emphasizes human-centric smart factory systems and integration of advanced technologies in production.
7. Veeramani, R., & Arunkumar, V. (2026). The intersection of human resource management and Industry 5.0: A bibliometric review of trends, themes, and future directions. *Future Business Journal, 12*(104).
   This study identifies three dominant HRM themes—human-centric systems, sustainability, and technological enablement—and positions HR as a strategic integrator in Industry 5.0.
8. Zhou, K., Liu, T., & Zhou, L. (2016). Industry 4.0: Towards future industrial opportunities and challenges. *Proceedings of the IEEE*.
   Provides background context for understanding the transition from Industry 4.0 to Industry 5.0.
9. Hasan, M. R., Khan, M. A., & Wuest, T. (2024). Towards Industry 5.0: A systematic literature review on sustainable supply chains. *arXiv preprint*.
   Highlights sustainability and circular economy integration within Industry 5.0 ecosystems.

10. Carayannis, E. G., & Morawska-Jancelewicz, J. (2022). The futures of Europe: Society 5.0 and Industry 5.0 as driving forces of future universities. *Journal of the Knowledge Economy*.
Discusses implications of Industry 5.0 for higher education and skill development.
11. Leng, J., Sha, W., Wang, B., Zheng, P., Zhuang, C., Liu, Q., & Wang, L. (2022). Industry 5.0: Prospect and retrospect. *Journal of Manufacturing Systems*.
Explores technological and human-centric integration in next-generation industries.
12. Nahavandi, S. (2019). Industry 5.0—A human-centric solution. *Sustainability*.
Introduces the concept of collaborative intelligence between humans and machines.
13. Ghobakhloo, M. (2020). Industry 4.0, digitization, and opportunities for sustainability. *Journal of Cleaner Production*.
Provides foundational insights into digital transformation leading to Industry 5.0.
14. Longo, F., Padovano, A., & Umbrello, S. (2020). Value-oriented and ethical technology engineering in Industry 5.0. *Applied Sciences*.
Focuses on ethical and human-centered technological design.
15. Calvo, A., Navarro, J., & Peris-Ortiz, M. (2022). Industry 5.0 and the future of work: Human-centric approaches in management systems. *Sustainability, 14*(18), 11394.
This study emphasizes the shift toward human-centric organizational systems and the role of management education in preparing future leaders.
16. Carayannis, E. G., Grigoroudis, E., Campbell, D. F. J., Meissner, D., & Stamati, D. (2021). The ecosystem as helix: An exploratory theory-building study of regional co-opetitive entrepreneurial ecosystems as Quadruple/Quintuple Helix Innovation Models. *R&D Management, 51*(1), 148–162.
Introduces innovation ecosystems relevant to Industry 5.0 and higher education transformation.
17. Chillakuri, B. (2020). Understanding Generation Z expectations for effective onboarding. *Journal of Organizational Change Management, 33*(7), 1277–1296.
Highlights emerging workforce expectations shaping HR education redesign.
18. Di Vaio, A., Palladino, R., Hassan, R., & Escobar, O. (2020). Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review. *Journal of Business Research, 121*, 283–314.
Explores AI integration and sustainability, both key to Industry 5.0 HR competencies.
19. Flores, E., Xu, X., & Lu, Y. (2020). Human Capital 4.0: A workforce competence typology for Industry 4.0. *Journal of Manufacturing Systems, 54*, 344–356.
Provides a foundational framework that can be extended into Industry 5.0 HR skill models.
20. Ghobakhloo, M., Iranmanesh, M., Vilkas, M., & Grybauskas, A. (2022). Industry 4.0, innovation, and sustainable development: A systematic review and future research directions. *Business Strategy and the Environment, 31*(6), 2827–2845.
Connects digital transformation with sustainability—core to Industry 5.0 evolution.
21. Leng, J., Ruan, G., Jiang, P., Xu, K., Liu, Q., Zhou, X., & Liu, C. (2021). Blockchain-empowered sustainable manufacturing and product lifecycle management in Industry 5.0. *Robotics and Computer-Integrated Manufacturing, 70*, 102134.
Discusses emerging technologies and their implications for workforce skills and HR roles.

22. Longo, F., Padovano, A., & Umbrello, S. (2021). Value-oriented and ethical technology engineering in Industry 5.0: A human-centric perspective for the design of the factory of the future. *Applied Sciences, 11*(9), 4182.
Highlights ethical and human-centered design, critical for HR leadership education.
23. Nankervis, A., Baird, M., Coffey, J., & Shields, J. (2021). *Human resource management: Strategy and practice* (10th ed.). Cengage Learning.
Provides foundational HRM theories relevant for redesigning HR curricula.
24. Pereira, V., Hadjielias, E., Christofi, M., & Vrontis, D. (2025). The future of HRM in Industry 5.0: A socio-technical systems perspective. *Computers & Industrial Engineering*.
Examines HRM transformation using socio-technical systems theory, emphasizing human–technology integration and strategic HR roles in Industry 5.0 environments.
25. Rifkin, J. (2014). *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism*. Palgrave Macmillan.
Although earlier, this work provides theoretical grounding for collaborative, human-machine economic systems relevant to Industry 5.0.