INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Vol.13 Issue 7, July 2025
Pg:- 01 – 12

Green Human Resource Capabilities and ESG-Aligned Circular Economy Practices for Sustainable Supply Chain Management

Viraj P. Tathavadekar [1] andDr. Nitin R. Mahankale [2]

1 Research Scholar, Symbiosis International University, Pune Email ID: Virajtatu@gmail.com,

ORCID: 0009-0004-8193-096X

Associate Professor, Symbiosis Centre for Management Studies, Pune, Symbiosis International University, Email ID: nitin.mahankale@scmspune.ac.in, ORCID: 0000-0002-1954-1312

Abstract

Purpose: This study explores the development of green human resource capabilities to facilitate ESG-aligned circular economy practices within sustainable supply chain management, addressing the critical gap between workforce competency development and environmental sustainability implementation.

Design/methodology/approach: A conceptual framework analysis integrating organizational learning theories with sustainability practices, examining capability development mechanisms through systematic literature review and practical implementation strategies.

Findings: Organizations developing integrated green HR capabilities demonstrate enhanced environmental performance, improved stakeholder engagement, and strengthened organizational learning capacity. The study identifies critical competency dimensions and implementation pathways for sustainable transformation.

Practical implications: Provides actionable frameworks for organizations to develop workforce capabilities supporting circular economy practices, offering guidance for HR professionals and sustainability leaders in creating effective learning and development programs.

Originality/value: Contributes novel insights connecting organizational learning with environmental sustainability through human resource capability development, bridging theoretical gaps in sustainable supply chain management literature.

Keywords: Green Human Resource Management, Organizational Learning, Circular Economy, Sustainable Development, Capability Development

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Vol.13 Issue 7, July 2025
Pg:- 01 – 12

1. Introduction

The global business landscape faces unprecedented pressure to align economic growth with environmental stewardship and social responsibility. Organizations increasingly recognize that sustainable supply chain management requires fundamental shifts in human resource capabilities and operational practices. The integration of green human resource management (GHRM) with Environmental, Social, and Governance (ESG) frameworks presents a strategic opportunity to embed circular economy principles throughout supply chain operations (Jia & Shang, 2024).

Contemporary supply chains operate within complex networks where environmental degradation, resource scarcity, and regulatory pressures demand innovative approaches to sustainability. Traditional linear supply chain models, characterized by take-make-dispose patterns, prove inadequate for addressing climate change imperatives and stakeholder expectations. This paradigm shift necessitates comprehensive transformation of human resource capabilities to support circular economy practices that minimize waste, maximize resource efficiency, and create regenerative value systems (da Silva et al., 2024).

Green human resource capabilities encompass specialized competencies, knowledge systems, and behavioral frameworks that enable organizations to implement environmentally conscious practices throughout their operations. These capabilities extend beyond traditional environmental compliance to encompass strategic thinking, innovation management, and collaborative leadership required for systemic transformation. ESG-aligned circular economy practices represent operational strategies that integrate environmental responsibility, social equity, and governance excellence into closed-loop supply chain systems (Ali et al., 2024).

The convergence of these elements creates synergistic opportunities for sustainable supply chain management. Organizations that successfully develop green HR capabilities while implementing ESG-aligned circular practices demonstrate superior environmental performance, enhanced stakeholder value, and improved long-term resilience (Tripathi et al., 2024). However, the integration process presents significant challenges including capability gaps, organizational resistance, measurement complexities, and stakeholder coordination difficulties.

This paper examines how green human resource capabilities can be strategically developed and deployed to support ESG-aligned circular economy practices within sustainable supply chain management frameworks. Through analysis of contemporary research and practical applications, this study provides insights into the mechanisms, benefits, and implementation strategies for organizations pursuing comprehensive sustainability transformation.

keywords: - Green Human Resource Management (GHRM), Environmental, Social, Governance (ESG), Circular Economy (CE), Sustainable Supply Chain Management (SSCM), Sustainability Capabilities

1.1 Conceptual Framework for Green HR Capabilities in Circular Supply Chains

Green human resource capabilities represent multidimensional competency frameworks that enable organizations to operationalize sustainability principles throughout their supply chain operations. These capabilities encompass technical expertise, behavioral competencies, and systemic thinking skills required for circular economy implementation (Jia & Shang, 2024). The development of such capabilities requires strategic integration of environmental awareness, innovation capacity, and collaborative leadership within existing human resource systems.

The foundation of green HR capabilities rests upon environmental literacy and systems thinking competencies. Employees at all organizational levels must understand ecological principles, resource flows, and environmental impacts associated with supply chain activities. This understanding extends beyond surface-level awareness to encompass deep comprehension of circular economy principles, including waste elimination, resource optimization, and regenerative design thinking (Ali et al., 2025). Technical competencies include life cycle assessment skills, environmental management systems knowledge, and sustainable technology evaluation capabilities.

Figure 1: Green HR Capability Development Framework

Behavioral competencies form the second pillar of green HR capabilities. These encompass change leadership skills, stakeholder engagement abilities, and collaborative problem-solving competencies essential for implementing circular practices across complex supply networks. Employees must demonstrate capacity for cross-functional collaboration, supplier relationship management, and community engagement to support comprehensive sustainability initiatives. Innovation mindset and continuous learning orientation enable adaptation to evolving sustainability requirements and technological advances.

Strategic competencies represent the third dimension of green HR capabilities. These include strategic planning skills for sustainability integration, performance measurement capabilities for environmental and social outcomes, and risk management competencies for sustainability-related challenges. Leaders must demonstrate ability to align sustainability objectives with business strategy, manage trade-offs between economic and environmental goals, and communicate sustainability value propositions to diverse stakeholder groups.

The integration of these competency dimensions creates comprehensive green HR capabilities that support ESG-aligned circular economy practices. Organizations must develop systematic approaches to capability assessment, development, and deployment to ensure effective implementation of sustainable supply chain strategies.

1.2 ESG Integration in Circular Economy Practices

ESG frameworks provide structured approaches for integrating environmental, social, and governance considerations into circular economy practices within supply chain operations. Environmental dimensions encompass resource efficiency, waste reduction, emissions management, and biodiversity conservation throughout supply chain networks. Social dimensions address labor practices, community impact, human rights, and stakeholder engagement across supply chain partners. Governance dimensions focus on transparency, accountability, risk management, and ethical decision-making processes.

ESG Dimension	Learning Components	Implementation Methods	Expected Outcomes
Environmental	Resource efficiency, Waste reduction, Emissions management	Training programs, Workshops, Practical applications	Reduced environmental impact, Improved efficiency
Social	Stakeholder engagement, Community development, Human rights	Collaborative experiences, Team projects, Cultural competency	Enhanced stakeholder relationships, Social equity
Governance	Transparent processes, Accountability, Ethical leadership	Structured programs, Mentoring, Compliance training	Improved transparency, Risk management

Table 1: ESG Integration Components in Circular Economy Practices

Environmental integration requires systematic implementation of circular design principles throughout supply chain operations. This includes material selection strategies that prioritize renewable, recyclable, and biodegradable resources, manufacturing processes that minimize waste generation and energy consumption, and distribution systems that optimize transportation efficiency and packaging sustainability (Ali et al., 2024). Reverse logistics capabilities enable product recovery, refurbishment, and recycling processes that close material loops and extend product lifecycles.

Social integration encompasses fair labor practices, community development initiatives, and stakeholder engagement programs throughout supply chain networks. Organizations must ensure safe working conditions, fair compensation, and professional development opportunities across all supply chain partners (da Silva et al., 2024). Community engagement initiatives support local economic development while addressing social challenges related to supply chain operations. Stakeholder engagement processes facilitate collaboration with customers, suppliers, communities, and regulatory bodies to support comprehensive sustainability objectives.

Governance integration establishes transparent reporting systems, accountability mechanisms, and ethical decision-making processes that support circular economy implementation. This includes sustainability performance measurement systems, stakeholder communication protocols, and risk management frameworks that address environmental and social challenges. Ethical sourcing practices, supplier evaluation criteria, and partnership agreements ensure alignment with sustainability principles throughout supply chain networks.

The integration of ESG dimensions creates comprehensive frameworks for circular economy implementation that address multiple stakeholder expectations while supporting long-term value creation. Organizations must develop systematic approaches to ESG integration that align with circular economy principles and support sustainable supply chain objectives.

1.3 Implementation Strategies and Organizational Capabilities

Successful implementation of green HR capabilities and ESG-aligned circular economy practices requires systematic organizational development strategies that address capability gaps, cultural transformation, and operational integration challenges. Organizations must develop comprehensive implementation frameworks that align human resource development with circular economy objectives while ensuring ESG compliance and stakeholder value creation.

Capability development strategies begin with systematic assessment of existing green HR competencies across organizational levels. This includes evaluation of environmental knowledge, sustainability skills, and behavioral competencies required for circular economy implementation (Jia & Shang, 2024). Gap

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Vol.13 Issue 7, July 2025
Pg:- 01 – 12

analysis identifies priority development areas and informs targeted training programs, recruitment strategies, and performance management systems. Competency frameworks provide structured approaches to capability development that align with organizational sustainability objectives and career development pathways.

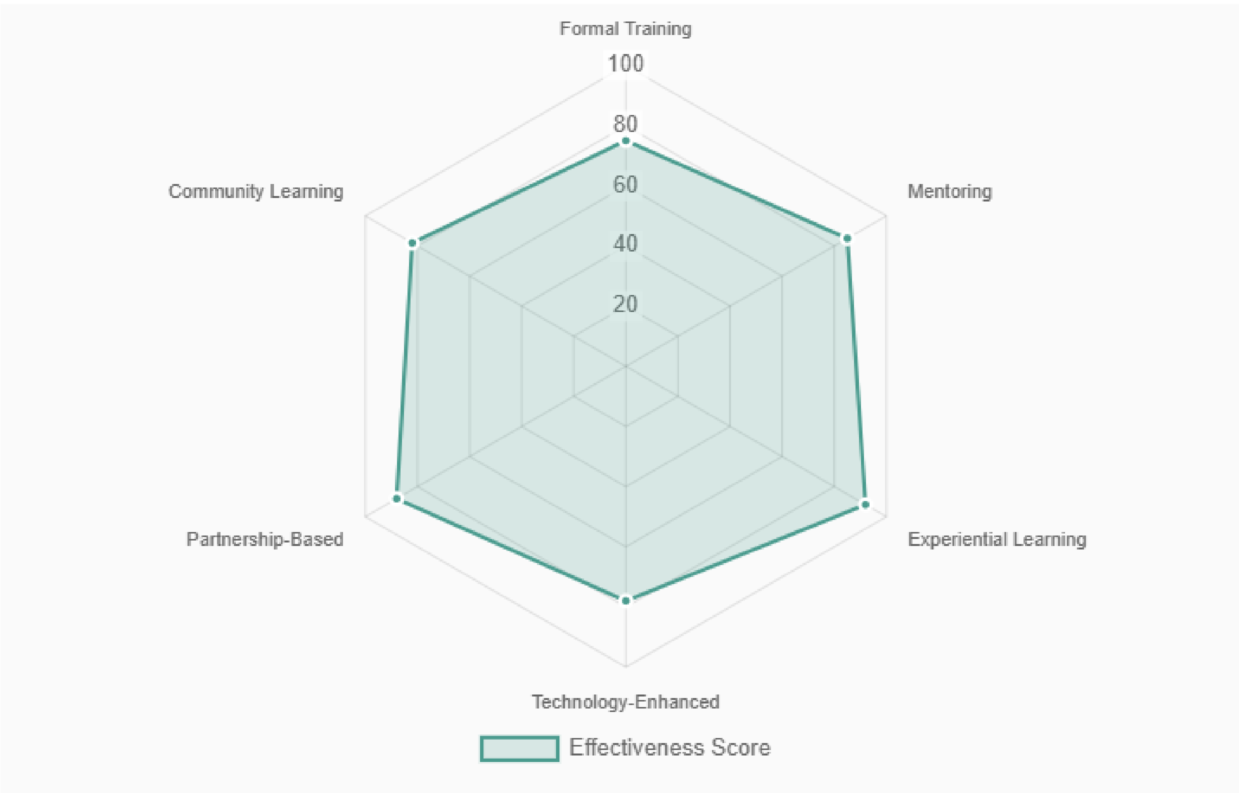

Figure 2: Implementation Strategy Effectiveness by Learning Approach

Cultural transformation initiatives support organizational acceptance and engagement with circular economy practices. Change management programs address resistance to sustainability initiatives while building commitment to environmental and social objectives. Leadership development programs ensure management capability to guide sustainability transformation and model desired behaviors. Communication strategies engage employees in sustainability vision and objectives while providing regular updates on progress and achievements.

Operational integration requires systematic alignment of human resource systems with circular economy practices. Performance management systems incorporate sustainability metrics and objectives into

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Vol.13 Issue 7, July 2025
Pg:- 01 – 12

individual and team evaluations. Reward systems recognize and incentivize sustainable behaviors and circular economy contributions. Candidates with competencies in sustainability and dedication to Environmental and Socials objectives will be given preference during the recruitment and selection process.

Partnership development strategies extend green HR capabilities throughout supply chain networks. Supplier development programs build sustainability competencies among supply chain partners while ensuring alignment with circular economy objectives. Collaborative initiatives facilitate knowledge sharing and best practice exchange across supply chain networks. Stakeholder engagement processes create opportunities for continuous learning and improvement in sustainability performance.

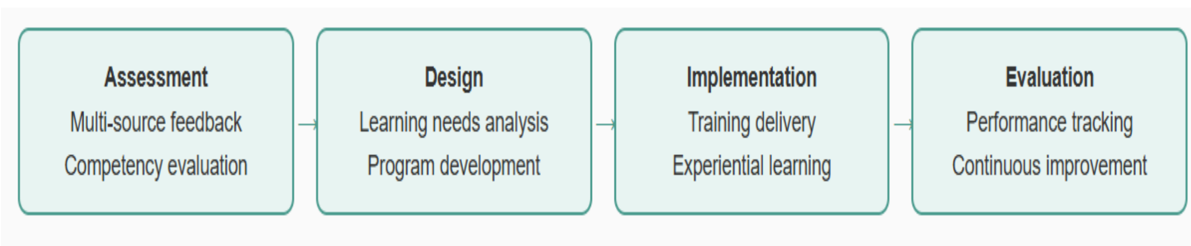

Figure 3: Learning-Based Implementation Process Flow

Technology integration supports implementation through digital platforms that enable circular economy tracking, measurement, and optimization. Data analytics capabilities provide insights into material flows, environmental impacts, and social outcomes throughout supply chain operations (Ali et al., 2025). Digital communication systems facilitate collaboration and coordination across supply chain partners while supporting transparency and accountability requirements.

1.4 Benefits and Performance of Sustainable Supply Chains

The integration of green HR capabilities and ESG-aligned circular economy practices generates multiple benefits for sustainable supply chain management including environmental performance improvements, economic value creation, and social impact enhancement. These benefits extend across organizational boundaries to create value for customers, suppliers, communities, and other stakeholders while supporting long-term competitiveness and resilience.

Environmental benefits include significant reductions in resource consumption, waste generation, and environmental emissions throughout supply chain operations. Circular economy practices enable organizations to minimize raw material requirements through improved efficiency, reuse, and recycling processes (Ali et al., 2024). Energy consumption reductions result from optimized processes, renewable energy adoption, and transportation efficiency improvements. Water conservation initiatives and pollution prevention measures contribute to ecosystem protection and regulatory compliance.

Economic benefits encompass cost reductions, revenue enhancement, and risk mitigation opportunities that support long-term financial performance. Material cost savings result from reduced resource consumption, waste elimination, and circular economy practices that extend product lifecycles and maximize resource utilization (da Silva et al., 2024). Operational efficiency improvements reduce production costs while enhancing quality and customer satisfaction. Innovation opportunities create new revenue streams through sustainable products, services, and business models that meet evolving customer demands.

Social benefits include improved working conditions, community development contributions, and stakeholder relationship enhancement throughout supply chain networks. Employee engagement and satisfaction improve through meaningful work that contributes to environmental and social objectives. Professional development opportunities in sustainability competencies enhance career prospects and organizational capability. Community partnerships create shared value through local economic development and social impact initiatives.

Value creation arises for the stakeholders not only through short-term operational advantages, but also via improved reputation, brand and in the market. Customer loyalty increases through authentic sustainability commitments and transparent communication about environmental and social performance. Investor confidence grows through demonstrated ESG compliance and long-term value creation capabilities. Regulatory relationships improve through proactive sustainability initiatives and collaborative approaches to environmental and social challenges.

Long-term resilience benefits include enhanced adaptability to environmental and social challenges, reduced regulatory risks, and improved stakeholder relationships that support sustainable growth. Organizations with strong green HR capabilities and circular economy practices demonstrate superior performance during economic downturns and environmental crises while maintaining stakeholder support and market position.

2. Challenges and Implementation Considerations

Despite significant potential benefits, the integration of green HR capabilities and ESG-aligned circular economy practices presents substantial challenges that organizations must address through strategic planning and systematic implementation approaches. These challenges encompass technical complexities, organizational resistance, measurement difficulties, and stakeholder coordination requirements that demand comprehensive management attention and resource allocation.

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Vol.13 Issue 7, July 2025
Pg:- 01 – 12

Capability development challenges include the scarcity of qualified professionals with comprehensive sustainability expertise, the complexity of circular economy knowledge requirements, and the need for continuous learning to address evolving sustainability standards and practices (Tripathi et al., 2024). Organizations must invest significant resources in training programs, recruitment strategies, and knowledge management systems to build required capabilities. The interdisciplinary nature of sustainability competencies requires integration across traditional functional boundaries, creating coordination challenges and potential conflicts.

Organizational resistance presents significant barriers to implementation including cultural inertia, risk aversion, and competing priorities that may undermine sustainability initiatives. Leadership commitment and change management expertise are essential for overcoming resistance while building organizational commitment to circular economy practices. Resource allocation decisions must balance short-term costs with long-term benefits, requiring sophisticated business case development and stakeholder communication strategies.

Measurement and evaluation challenges encompass the complexity of sustainability metrics, the difficulty of quantifying circular economy benefits, and the need for integrated reporting systems that address multiple stakeholder requirements (Ali et al., 2025). Organizations must develop comprehensive measurement frameworks that capture environmental, social, and economic outcomes while supporting decision-making and continuous improvement processes. Data collection and analysis capabilities require significant investment in technology systems and analytical expertise.

Supply chain coordination challenges include the need for collaborative relationships with multiple partners, the complexity of aligning diverse organizational cultures and capabilities, and the difficulty of ensuring consistent sustainability performance across extended networks. Partnership development requires significant relationship management capabilities and may involve substantial transaction costs and coordination complexities.

Regulatory and compliance challenges encompass evolving sustainability standards, varying requirements across geographic markets, and the need for proactive compliance management that addresses future regulatory developments. Organizations must develop comprehensive regulatory intelligence capabilities and maintain flexibility to adapt to changing requirements while ensuring consistent compliance across all operations.

3. Conclusion and Future Research Directions

This analysis demonstrates that the integration of green human resource capabilities with ESG-aligned circular economy practices creates significant opportunities for sustainable supply chain management

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Vol.13 Issue 7, July 2025
Pg:- 01 – 12

transformation (da Silva et al., 2024). Organizations that successfully develop comprehensive green HR capabilities while implementing systematic circular economy practices achieve superior environmental performance, enhanced stakeholder value, and improved long-term resilience. However, implementation success requires strategic commitment, systematic capability development, and collaborative stakeholder engagement throughout the transformation process.

Table 3: Future Research Directions and Opportunities

Research Area	Specific Focus	Methodology	Expected Contribution
Learning Effectiveness	Cross-organizational comparison	Longitudinal case studies	Best practice identification
Technology Integration	Digital learning platforms	Experimental design	Enhanced learning outcomes
Cross-cultural Analysis	Geographic adaptation	Comparative analysis	Cultural sensitivity frameworks
Measurement Frameworks	Standardized assessment	Framework development	Benchmarking tools

Table 2: Future Research Directions and Opportunities

The strategic implications for organizations include the need for long-term investment in green HR capability development, systematic integration of ESG principles into circular economy practices, and comprehensive stakeholder engagement strategies that support sustainable supply chain transformation. Leadership commitment and change management expertise are essential for overcoming implementation challenges while building organizational capability for continuous improvement and adaptation.

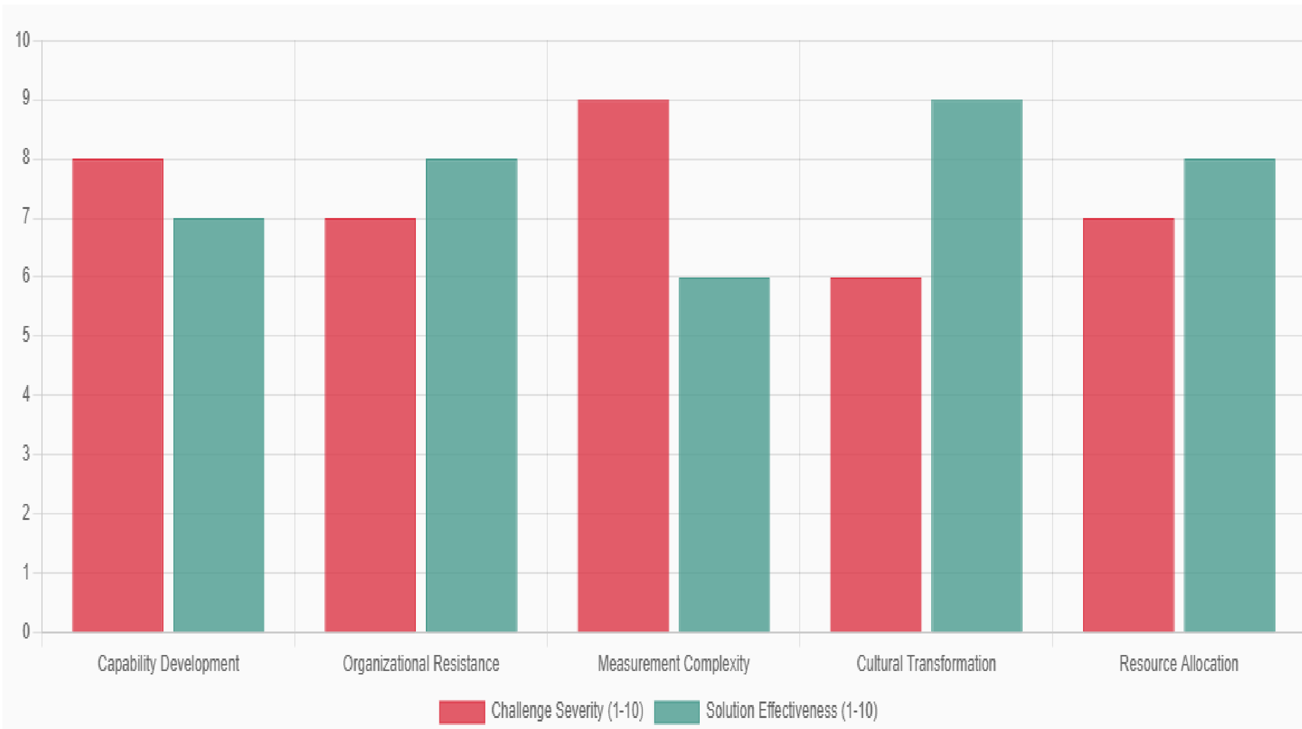

Figure 4: Implementation Challenges and Solution Strategies

future research opportunities include longitudinal studies of implementation outcomes across diverse industry sectors, comparative analysis of different capability development strategies, and investigation of stakeholder engagement mechanisms that support circular economy transformation (Tripathi et al., 2024). Technology integration opportunities, including digital platforms and analytics capabilities, require further investigation to understand optimization potential and implementation requirements.

The development of standardized measurement frameworks and benchmarking systems would support organizational learning and performance comparison across different implementation approaches. Cross-cultural research examining implementation strategies in different geographic and cultural contexts would enhance understanding of adaptation requirements and success factors.

Regulatory framework development and policy implications require continued investigation to understand the role of government initiatives in supporting private sector sustainability transformation. The intersection of circular economy practices with emerging technologies such as artificial intelligence and blockchain presents additional research opportunities that could enhance implementation effectiveness and stakeholder value creation.

4. References

Ali, Z.A., Zain, M., Hasan, R., Al Salman, H., Alkhamees, B.F., &Almisned, F.A. (2024, May 22). Circular Economy Advances with Artificial Intelligence and Digital Twin: Multiple-Case Study of Chinese Industries in Agriculture. *Journal of the Knowledge Economy*, *16*(1), 2192-2228. https://doi.org/10.1007/s13132-024-02101-w

Ali, Z.A., Zain, M., Hasan, R., Pathan, M.S., AlSalman, H., &Almisned, F.A. (2025, May 5). Digital twins: Cornerstone to circular economy and sustainability goals: Digital twins: cornerstone to circular economy and sustainability goals. *Environment, Development and Sustainability*, 1-42. https://doi.org/10.1007/s10668-025-06221-4

da Silva, A.D.S., da Silva, W.V., da Silva, L.S.C.V., da Cruz, N.J.T., Su, Z., & da Veiga, C.P. (2024, May 22). Interdependence between supply chains and sustainable development: Global insights from a systematic review. *Review of Managerial Science*, *19*(3), 931-962. https://doi.org/10.1007/s11846-024-00770-0

Jia, S., & Shang, H. (2024, January 5). Utilizing green financing in developing green HRM resources for carbon neutrality: Presenting multidimensional perspectives of China. *Environmental Science and Pollution Research*, *31*(6), 8798-8811. https://doi.org/10.1007/s11356-023-31560-y

Tripathi, S., Bachmann, N., Brunner, M., Rizk, Z., &Jodlbauer, H. (2024, May 6). Assessing the current landscape of AI and sustainability literature: Identifying key trends, addressing gaps and challenges. *Journal of Big Data*, *11*(1). https://doi.org/10.1186/s40537-024-00912-x