

AI-ENABLED HIGHER EDUCATION FOR SUSTAINABLE TECHNOPRENEURSHIP: INTEGRATING GREEN HRM AND DIGITAL INNOVATION

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Abstract

The merging of Artificial Intelligence (AI), sustainability imperatives, and entrepreneurial ecosystems is transforming the landscape of higher education. Institutions are increasingly expected to nurture technopreneurs who are not only digitally competent but also environmentally and socially responsible. This conceptual study proposes an integrative framework that connects AI-enabled learning ecosystems, Green Human Resource Management (GHRM) practices, and digital innovation capabilities to foster sustainable technopreneurship among management and IT students. The study identifies four strategic objectives: (1) examining AI-driven educational transformation, (2) analysing the role of Green HRM in shaping sustainability-oriented mindsets, (3) assessing digital innovation competencies for technopreneurship, and (4) developing a roadmap model for sustainable technopreneurial development. A Smart University case illustration is used to contextualize the framework. The paper contributes by integrating technological, human resource, and sustainability perspectives into a unified higher education roadmap aligned with sustainable development goals (SDGs).

Keywords: AI-enabled education, Sustainable technopreneurship, Green HRM, Digital innovation, Higher education transformation, Industry 5.0, Sustainability education, Entrepreneurial ecosystem

1. Introduction

Higher education is undergoing a paradigm shift due to rapid advancements in Artificial Intelligence (AI), Industry 5.0, and sustainability mandates. Traditional entrepreneurship education is no longer sufficient to address complex global challenges such as climate change, digital inequality, and responsible innovation. Institutions must cultivate **technopreneurs** — entrepreneurs who leverage advanced technologies to create sustainable economic, environmental, and social value.

AI-enabled learning systems, predictive analytics, adaptive platforms, and intelligent mentoring tools are reshaping teaching–learning processes. Simultaneously, Green Human Resource Management (GHRM) promotes environmentally responsible behavior, ethical leadership, and sustainable organizational culture. When combined with digital innovation capabilities, these elements can create a robust ecosystem for sustainable technopreneurship.

Despite growing literature on AI in education and sustainable entrepreneurship, limited research integrates AI, Green HRM, and digital innovation within a unified higher education roadmap. This paper addresses this gap.

2. Objectives of the Study

1. To examine the role of AI-enabled higher education in developing technopreneurial competencies.
2. To analyse how Green HRM practices in academic institutions foster sustainability-oriented entrepreneurial mindsets.
3. To evaluate the contribution of digital innovation capabilities in promoting

sustainable technopreneurship.

4. To propose an integrated roadmap model linking AI, Green HRM, and digital innovation for sustainable technopreneurial development.

3. Literature Review

3.1 AI in Higher Education

AI technologies such as adaptive learning systems, predictive analytics, virtual labs, and AI tutors enhance personalized learning and skill mapping. Studies indicate AI improves decision-making, innovation exposure, and experiential learning — critical components of entrepreneurial education. However, research largely focuses on learning efficiency rather than entrepreneurial sustainability outcomes.

3.2 Sustainable Technopreneurship

Sustainable technopreneurship integrates technological innovation with environmental and social responsibility. It emphasizes:

- Resource-efficient innovation
- Circular economy models
- ESG-driven business strategies
- Technology-enabled sustainability solutions

Existing research highlights entrepreneurial intention models but lacks integration with institutional digital transformation.

3.3 Green HRM in Educational Institutions

Green HRM includes:

- Green recruitment and selection
- Sustainability training
- Environmental performance evaluation
- Green organizational culture

In universities, GHRM can influence students

through sustainability-driven faculty practices, green campus policies, and ethical leadership modeling. Literature suggests positive linkage between green culture and pro-environmental entrepreneurial behavior.

3.4 Digital Innovation Capability

Digital innovation capability refers to the ability to use cloud computing, IoT, AI, blockchain, and analytics for business model transformation. Universities with strong digital infrastructure encourage:

- Startup incubation
- Prototype development
- Innovation labs
- Industry collaboration

However, integration with sustainability and HR frameworks remains underexplored.

4. Objectives of the Study

Objective 1: Role of AI-Enabled Higher Education in Developing Technopreneurial Competencies

AI-enabled systems contribute through: Green HRM Integration

- Personalized skill analytics identifying entrepreneurial strengths
- Simulation-based startup labs
- Predictive analytics for market feasibility studies
- AI-driven mentorship platforms

Example: A Smart MBA-IT program uses AI dashboards to track students' innovation projects, sustainability alignment, and digital readiness scores. Students receive automated feedback on ESG impact potential of their startup ideas.

Impact:

- Improved innovation readiness
- Data-driven entrepreneurial decision-making
- Enhanced sustainability alignment

Objective 2: Role of Green HRM in Fostering Sustainability-Oriented Entrepreneurial Mindset

Green HRM in higher education shapes values and behavioral norms through:

- Sustainability-oriented curriculum
- Green performance appraisal of faculty
- Eco-innovation competitions
- Green campus certification programs

Example: A university integrates sustainability KPIs into faculty evaluation and startup incubation support. Students are encouraged to design carbon-neutral business models.

Impact:

- Ethical decision-making
- Environmental consciousness

- Responsible innovation behavior

Objective 3: Digital Innovation Capability and Sustainable Technopreneurship

Digital innovation capability enables:

- AI-based resource optimization
- Cloud-enabled scalable startups
- IoT-driven sustainability solutions
- Blockchain for transparent supply chains

Example: Students develop an AI-powered waste management startup using IoT sensors and predictive analytics to optimize municipal waste collection.

Impact:

- Technology-driven sustainability solutions
- Scalable green business models
- Higher startup survival probability

Objective 4: Integrated Roadmap Model The proposed roadmap consists of:

Stage 1: AI Infrastructure Development

- Adaptive learning platforms
- Innovation analytics dashboards

Stage 2:

- Sustainability training
- Green leadership modeling
- ESG evaluation metrics

Stage 3: Digital Innovation Ecosystem

- Incubation centers
- Industry collaboration
- Funding support

Stage 4: Sustainable Technopreneurial Outcomes

- Green startups
- Social innovation ventures
- SDG-aligned enterprises

This model creates a circular reinforcement loop where AI strengthens innovation skills, Green HRM builds ethical foundations, and digital capability ensures technological scalability.

6. Conclusion

AI-enabled higher education has transformative potential in building sustainable technopreneurs. However, technological advancement alone is insufficient. Integrating Green HRM practices ensures ethical orientation, while digital innovation capability provides technological scalability.

The study proposes a comprehensive roadmap that aligns AI infrastructure, sustainability culture, and innovation ecosystems within higher education institutions. This integrative approach supports Industry 5.0 principles by emphasizing human-centric, sustainable, and technology-driven entrepreneurship.

Future empirical research may validate the model using Structural Equation Modeling (SEM) or multi-institutional surveys across management and IT institutions.

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