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Digital Transformation and the Synergistic Evolution of Green Talent Capacity: Theoretical Lineage, Research Progress and Future Prospects

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Abstract: Against the backdrop of the deep integration of global climate change and digital technology, the synergistic evolution of digital transformation and green talent capacity has become a core issue for organisations to achieve sustainable development. This paper reveals the theoretical links and practical paths between the two by systematically reviewing recent research results: digital transformation optimises the traceability and efficiency of green practices through technological means such as e-HRM and intelligent algorithms [1], while green talent capabilities drive low-carbon transformation of enterprises through green innovation behaviours [2], and environmental behaviours of organisational citizenship [3], drive the low-carbon transition of firms. Studies have shown that the synergy between the two significantly enhances organisational resilience [4], green reputation, and dual innovation capabilities [5], but cross-cultural differences (e.g., China-Brazil hospitality comparison) and ethical risks of technology [6] still need to be addressed) still need attention. The current study has problems such as insufficient theoretical integration and limited industry coverage, and in the future, it is necessary to construct a dynamic model of green technology-green capability-green culture, to explore the potential of green applications of meta-universe and generative AI, and to promote the tripartite linkage of 'policy-company-university'. This paper argues that digital transformation and green capabilities are the key to the development of a green culture. This paper argues that the synergy between digital transformation and green competence should not be limited to instrumental integration, but should become the core gene of organisational strategy, in order to realise the two-way empowerment of 'digital greening' and 'green digitisation'.

Keywords: Digital Transformation; Green Talent Capability; Green Human Resource Management; Sustainability; Synergistic Evolution.

1. Introduction

Green talent competence plays a central role in environmental practices, green innovation and sustainable culture, technology-enabled optimisation of processes and decision-making, technology-driven human resource management (HRM) practices, and the construction of a 'digital + green' dual-competence system. Based on the analysis of literature, this paper comprehends the theoretical lineage and the progress of practice, and proposes the direction of future research.

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2. Theoretical Framework: The Intrinsic Connection between Digital Transformation and Green Talent Competence

The Enabling Role of Digital Transformation

Digital transformation reconfigures the HRM process through technologies such as electronic human resource management (E-HRM), big data analysis and artificial intelligence, etc. The E-HRM system can track employees' behaviours and work styles in real time, record and save employees' green behavioural data, and conduct statistical analysis for all data with training experiences, capture green training data and further assessment of green performance [1]. The use of digital tools can enhance the transparency, measurability and visualisation of green practices, and there are cases where the distribution of carbon footprints has been verified through blockchain technology and monitored and tracked [7].

Expansion of Green Talent Competencies

Green talent competencies encompass environmental skills, but also involve green innovation behaviours [2], organisational citizenship behaviours [3]and identification with a sustainable culture [8]. Fostering green recruitment, green training and green reward mechanisms that rely on green human resource management (GHRM) practices [9].

Driving Mechanisms for Synergistic Evolution

The underlying logic of the synergy between the two lies in the fact that digital transformation provides the technological underpinning for green competencies, while green talent competencies infuse digital transformation with sustainable goals, with GHRM enabling accurate matching of green skills needs through digital platforms [10], and with green innovation behaviours driving the adoption of lower-carbon digital solutions by organisations [5].

3. Research Progress: Empirical Findings, Key Themes

Green HRM and digitalisation convergence practices, Green recruitment and digital screening

Intelligent algorithms can identify candidates' sustainability values and enhance green talent matching efficiency [9]. Digitally-driven green training: virtual reality (VR) technology simulates environmental scenarios to strengthen employees' environmental awareness [11], and quantifies employees' green contributions based on big data analysis and links them to compensation [1].

Impact of synergies on corporate sustainability

Studies have shown that the synergy between digital transformation and GHRM significantly enhances organisational resilience [4], green reputation and innovation performance [5]. In Bangladeshi manufacturing industry, the combination of green intellectual capital and digital HRM achieved sustainable performance improvement through dual innovation (exploratory and utilisation) [5]. A cross-cultural perspective of differentiation manifests itself in the hospitality industry where Chinese employees responded stronger to green transformation leadership than their Pakistani counterparts [3], highlighting the moderating effect of cultural context on synergistic effects.

4. Existing Gaps and Future Prospects

Green HRM and digitalisation convergence practices, Green recruitment and digital screening

Research Gaps

Insufficient theoretical integration: most studies explore digital transformation or GHRM in isolation and lack dynamic modelling of synergistic mechanisms. The ethical risks of technology application exist, digital monitoring may trigger employees' privacy concerns and weaken the autonomy of green behaviours [6]; Industry and geographical limitations: existing empirical evidence focuses on manufacturing and hospitality, and lacks the exploration of public services, agriculture, and other fields.

Future Research Directions

Developing an integrated theoretical framework: combining institutional theory and the resource base perspective to construct a synergistic model of 'green technology, green capability and green culture'. Explore the potential of emerging technologies: study the application of meta-universe and generative AI in green scenario simulation and collaborative innovation. Strengthening the linkage

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between policy and enterprise practice: a tripartite policy-enterprise-university synergistic green digital skills cultivation programme.

5. Conclusion

The current research has initially revealed the synergistic value of digital transformation and green talent competence, but more cross-disciplinary and cross-situational explorations are needed, especially at the level of technological ethics and systemic change. In the future, organisations need to embed green competencies at the core of their digital strategies, rather than viewing them as merely subsidiary goals.

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