Proceedings of the Fourth Australian International Conference on Industrial Engineering and Operations Management, Melbourne, Australia, November 25-27, 2025

Proceedings of the International Conference on Industrial Engineering and Operations Management

Publisher: IEOM Society International, USA DOI: 10.46254/AU04.20250080
Published: November 25, 2025

Integrating Human–AI Synergy for Knowledge Ecosystem Transformation: A Socio-Technical Framework for Resilient Innovation

Imran Ali
Associate Professor, Operations & Innovation Management
School of Business and Law
Central Queensland University, Melbourne Campus, Australia
i.ali@cqu.edu.au

Abstract

Artificial intelligence (AI) is redefining how organisations create, share, and utilise knowledge, driving a paradigm shift in both human roles and technological processes. While substantial progress has been made in developing intelligent systems, limited research has explored how humans and AI collaborate within dynamic knowledge ecosystems to foster sustainable innovation and organisational resilience. This study addresses this gap by examining human–AI synergy through a socio-technical systems perspective, investigating how human cognition, technological adaptability, and institutional structures collectively influence knowledge creation, learning, creativity, and performance outcomes. Employing a systematic review of 101 peer-reviewed studies published between 2014 and 2024, the research applies an Antecedent–Mediator–Moderator–Outcome (AMMO) framework to conceptualise the conditions that enable effective human–AI collaboration. Findings reveal that successful integration depends on the alignment of human judgment and algorithmic intelligence, built upon mutual trust, transparency, and interpretability. Cognitive complementarity, ethical assurance, and emotional engagement emerge as key mediators enhancing decision quality and innovation. Organisational readiness, digital infrastructure maturity, leadership commitment, and regulatory environments serve as critical moderators shaping collaboration effectiveness. The study identifies several challenges, including automation bias, over-dependence on algorithms, data inequities, and potential erosion of human creativity and accountability. These challenges highlight the need to balance automation efficiency with human autonomy through adaptive governance, inclusive design, and ethical frameworks. The proposed conceptual model provides a roadmap for designing resilient, equitable, and learning-oriented human–AI ecosystems that support continuous improvement and innovation. This research contributes to both academic discourse and managerial practice by advancing an integrative socio-technical framework that links digital transformation with organisational learning and sustainability. For practitioners, it offers actionable insights into developing governance mechanisms, capacity-building strategies, and leadership practices that foster collaboration between humans and intelligent systems. Furthermore, the study emphasises the importance of cultivating digital trust, enhancing data literacy, and embedding ethical principles across organisational processes to achieve long-term resilience. Ultimately, the paper positions human–AI collaboration as a transformative organisational capability essential for navigating uncertainty, enhancing knowledge agility, and achieving sustainable value creation. In an era marked by intelligent automation and rapid technological change, this study underscores that the future of work and innovation depends not solely on AI's sophistication, but on how effectively humans and technology co-evolve to shape adaptive, ethical, and resilient knowledge ecosystems.

Keywords

Artificial Intelligence, Human–AI Collaboration, Knowledge Ecosystems, Digital Transformation, Socio-Technical Systems

Biography

Dr Imran Ali is a globally ranked researcher, academic leader, and innovative educator recognised for his contributions to digital transformation, logistics, operations, and supply chain management. As Discipline Leader and Associate Professor at Central Queensland University's Melbourne Campus, he leads initiatives in Management and Innovation. His research advances understanding of AI, blockchain, and resilience in global supply chains, aligning with several UN Sustainable Development Goals. Ranked among the top 2% of researchers worldwide (Stanford University, 2023), Dr Ali has published extensively in leading journals and received multiple awards for research excellence and academic leadership