



Editorial

Editorial: Bridging the Gap between Sustainable Manufacturing and Intelligent Systems

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Consider a remanufacturing facility receiving a batch of spent electric vehicle batteries. Each unit carries a different history of use, degradation, and residual value. The question of which should be refurbished, which disassembled for components, and which sent for materials recovery is not merely logistical; it is a decision problem that demands both environmental awareness and data-driven intelligence. Yet the tools to answer it reliably, and at scale, have until recently not existed in coherent form. It is precisely at this intersection, where the imperatives of sustainability meet the capabilities of intelligent systems, that the new journal Sustainable Manufacturing and Intelligent Organisation (SMIO) has been founded, and it is a development I strongly welcome.

The manufacturing and operations landscape is undergoing a dual transformation. Increasing pressure to reduce environmental impact, conserve resources, and improve circularity has coincided with the rapid development of data-driven and intelligent technologies. These trends are often treated as separate topics, addressed by separate research communities, and published in separate journals. Yet in practice, they are interconnected. It is therefore not only timely but necessary to have a dedicated venue that brings them into constructive dialogue.

My own work in remanufacturing and intelligent systems has brought this convergence into sharp relief. Remanufacturing depends fundamentally on high-quality decision-making under uncertainty: the condition of incoming products is rarely fully known, process yields are variable, and market conditions shift. The increasing availability of sensing, modelling, and artificial intelligence tools offers real opportunities to address these challenges, from improving disassembly sequencing and automating condition assessment to optimising real-time scheduling and predicting the value of recovery pathways.

However, progress remains uneven. Data sparsity at a product's end of life continues to hinder reliable decision-making, and current computational models often fail to reflect the complexity of industrial-scale operations. Moreover, a significant gap persists between research advances and their practical adoption. These challenges are inherently interdisciplinary and demand the kind of integrated, cross-cutting research that SMIO is designed to promote.

The journal's scope reflects this ambition well. Research on circular economy models, life cycle assessment, eco-design, and green supply chains sits alongside work on Industrial Internet of Things systems, predictive maintenance, machine learning, cyber-physical systems, and digital twins. What distinguishes SMIO is not only the breadth of topics it covers, but the expectation that contributions will engage seriously with both dimensions. A paper on intelligent inspection, for example, should consider what such capability implies for material recovery rates, energy consumption and circular value retention, not merely for algorithmic performance.

One area that I would particularly encourage the journal to develop is the human and organisational dimension of this transition. The adoption of intelligent technologies in sustainable manufacturing is not solely a technical challenge. It depends on workforce skills, the readiness of organisations to integrate new data infrastructure, the ethical governance of automated decision-making, and the willingness of supply chain partners to share information. These factors are frequently underweighted in the research literature, yet they often determine



whether technically sound innovations succeed or stall in practice. A journal that takes the ‘organisation’ in its title seriously will, I hope, provide a home for work that addresses these softer but no less critical subjects.

Looking ahead, we can expect the research questions in this space to grow in both urgency and complexity. The electrification of transport, the proliferation of renewable energy infrastructure, and the increasing material intensity of digital technologies are creating vast flows of complex, high-value products that will reach end of life over the coming decade. Efficiently and cost-effectively recovering the value embedded in those products will require systems of a sophistication that current industrial practice cannot yet deliver. Closing that gap is, I would argue, one of the more consequential engineering and management challenges of the near term.

SMIO arrives at the right moment. By creating a coherent space for interdisciplinary work that is methodologically rigorous, practically grounded, and genuinely integrative, the journal has the potential to accelerate progress that neither the sustainability literature nor the intelligent systems literature can achieve alone. On behalf of the Editor-in-Chief, Professor Guangdong Tian, and the Editorial Board, I warmly invite colleagues across our community to engage: through submissions, through proposals for special issues, and through participation as reviewers. The field needs this journal. I look forward to seeing what it produces.

Conflicts of Interest

The authors declare no conflict of interest.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.