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# Guest editorial: Strategic alignment between Industry 4.0 and operational excellence methodologies for smart manufacturing

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Industry 4.0 is a new paradigm for industry that leads to improved organizational sustainability through the systematic integration of digital technologies with different sets of industrial operations (Kaswan *et al.*, 2022). It is a new model for future industries that induces considerable improvement through automation and digitization (Khanzode *et al.*, 2021). This is due to the integration aspects of the value chain and manufacturing systems with cyber-physical technologies and the Internet of things (IoT) (Yilmaz *et al.*, 2022). In the past decade, Industry 4.0 has been classified as a strategic paradigm to make organizations competitive through improvements in quality, productivity, defects, waste reduction, etc (Buer *et al.*, 2018; Tortorella *et al.*, 2019). I4.0 technologies can help operations in many ways, such as reducing processing time, production cost, improving process flexibility, achieving world-class product quality, customer service, product customization, etc (Zizic *et al.*, 2022). To be a continuous stakeholder in the market different performance improvement methods or operational excellence (OPEX) approaches are being adopted by the industries (Zheng *et al.*, 2018). But to meet the current demands related to shorter product life cycles, assessment of environmental and social aspects of sustainability, and to be more responsive in actions and decisions, I4.0 technologies are now being integrated with OPEX to gain strategic advantages over competitors (Ghobakhloo, 2020). Both OPEX and I4.0 share common goals related to improvement in profitability dynamics, employee performance and waste reduction. However, the integration of I4.0 with OPEX to gain strategic benefits in terms of improvement in different quality, ecology and social sustainability metrics (Kumar *et al.*, 2024) has not been explored much in the academic literature. This Special Issue (SI) attempts to address the unexplored aspects related to I4.0 and OPEX strategies together. This SI article provides guidelines to industrial managers, practitioners and potential researchers to integrate OPEX with digital technologies, together will different execution methods of the integrated approaches. These insights will boost the applications of integrated OPEX-I4.0 technologies in the different industrial entities and organizations. The industries will benefit through quick response to different challenges related to performance and operation. This SI provides different theoretical aspects like fundamental pillars that laid the foundation for effective execution of I4.0 practices. Further, this SI provides guidelines to integrate IoT based systems with machining systems in small and medium enterprises (SMEs) to enhance organizational sustainability. This will allow a significant leap in the applications of digital technologies within SMEs which has not yet been fully explored due to different technological and financial constraints within these enterprises. This SI provides different methods to explore, estimate and improve social sustainability in terms of labor wellness, their employment, retention, well-being, health, safety, care for local population.

This SI has manifold implications for industrial managers to improve social and environmental sustainability along with traditional quality characteristics for their organizations. Further, articles on this issue provide avenues to establish synergy among



tools of OPEX methodologies and I4.0 technologies and provide a comprehensive guide for execution of the same to achieve desired targets related to sustainability. Besides, this SI provides different conceptual frameworks of integrated approaches and also provides numerous case studies to execute the digitally enabled OPEX methods. This will assist the industrial managers to implement the same within their industrial setting to meet targets set by different pacts for environmental protection. The articles in this SI also assist in the identification of different metrics related to environmental and social sustainability and also focused on which metrics should be considered at different execution levels of integrated I4.0 with OPEX methods. The SI also assists industrial managers to comprehend different aspects of social sustainability that will assist them to maintain a high level of employee work satisfaction and level of technological enrichment among employees that will in turn lead to more resilient industrial organization.

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