

# Challenges in Implementation of Industry 4.0 in Manufacturing Sector

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## ABSTRACT

The advent of advanced technologies has driven the manufacturing industries towards fourth industrial revolution, termed as Industry 4.0 (I4). The breakthrough technologies of I4, such as Artificial Intelligence (AI), Internet of Things (IoT), cloud computing, additive manufacturing and robotics which have almost become ubiquitous, bridged the gap between physical and cyber world. There is an unprecedented opportunity for industrialists to exploit new technologies in order to produce high quality customized products at a lower operating cost and mass production. This has led to the increase in market competitiveness and therefore, to remain in competition, manufacturing sector is compelled to adopt these technologies. However, majority of the companies are yet to transform into a smart factory. The purpose of this literature is to identify the challenges that inhibits the manufacturing sector from implementing I4 and its consequences that will be faced in the future. An extensive literature review was conducted on I4 and its related topics in the context of manufacturing sector. The study gave insight into potential challenges that are essential to overcome in order to fully utilize the benefits of I4 technologies. Consequently, the identified challenges were analysed under five major segments: privacy and security, finance, human resources, operations management and education. It focuses on both technical and managerial issues in accordance with the literature's objective. It was concluded from the analysis that wide interconnectivity of system makes manufacturing facility vulnerable to cyber-attacks and automation can be a risk for employment. A proper planning and strategy is required before embracing I4 to prevent operational disruption. It was also observed that technical challenges are often considered as the most important, though education can be a critical factor in the long-term goal. To conclude, the literature contributes to the discussion of I4 implementation challenges and also gives an overview of future research prospects of I4 in manufacturing sector.

**Keywords:** Industry 4.0, challenges, manufacturing, smart factory, Artificial Intelligence, Internet of Things

