Chapter 2
Artificial Intelligence and Blockchain Technology in the 4.0 IR Metaverse Era:
Implications, Opportunities, and Future Directions

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ABSTRACT

The advancement of SMEs is accelerated by technological expansions using blockchain technology in the Industrial Revolution (IR) 4.0 era. Based on current trends in AI and blockchain technology, this study proposes that the distance between entrepreneurs all over the world and their potential workers may be greatly decreased to virtually real-time. A secondary literature review is carried out in order to identify the key developments in IR 4.0 technologies in the SMEs industry, as well as the potential trend that will lead the business sector. The adoption of AI and blockchain technology in the IR 4.0 technologies is projected to make seeking treatments overseas more reasonable, accessible, and health records readily available on a real-time and protected basis. However, it is necessary to highlight that the expansion of SMEs raises the eyebrows of society from the security, social, and economic viewpoints.

INTRODUCTION

The latest industrial revolution known as "Industry 4.0" is the result of recent advancements in production techniques and automation. Data management, industrial competitiveness, production processes, and efficiency may all be included under the umbrella term "industry 4.0" (Alaloul et al., 2020). Cyber physical systems, the Internet of Things, artificial intelligence, big data analytics, and digital twins are just a few of the key enabling technologies that are referred to as part of the "Industry 4.0" movement. These technologies are seen as the main drivers of automated and digital manufacturing environments. The United Nations (UN) Sustainability 2030 agenda highlights sustainability as the cornerstone of corporate strategy and calls for smart manufacturing, energy-efficient construction, and low-impact industrialisation (Rakshit et al., 2022). Industry 4.0 technology aid in making company processes more sustainable. Globalization, mass customisation, and a competitive business climate are pressuring "traditional" sectors to embrace new business models and move toward Industry 4.0. Industry 4.0 technologies are a recent revolution in manufacturing that seeks to maximize productivity and efficiency while utilizing the least amount of resources possible. Industry 4.0 technologies have ushered in a new manufacturing trend in sectors that intended to maximize production through efficient resource usage. Industry 4.0's "smart manufacturing" or "digital manufacturing" can be seen as its fundamental component since it enables businesses to undertake flexible production processes with mass customisation (Alcácer & Cruz-Machado, 2019).

Artificial intelligence (AI) and blockchain technology, for example, have made significant contributions to economic growth and civilizational advancement. AI and blockchain technology are two technological developments with significant growth potential since they are altering the way economic transactions are conducted. Artificial intelligence and blockchain technology are already in widespread usage; it's just an issue of scale and perspective (Ariffin & Ahmad, 2021). After limiting their reach to local partners for so long, SMEs are now expanding their reach, particularly through digital technology, into a global strategy that is spreading in all directions. Individuals and small companies are increasingly being targeted by enterprises, and consumers and customers are becoming "cocreators" and actively engaging. Due to the limitations of blockchain technology, it must recreate itself on the basis of renewed trust and ethical concepts. Given that AI and BT are ubiquitous, it's interesting to observe how AI and blockchain technology interact with 4.0 IR, and one of the most intriguing features for academics is its ability to revolutionize innovation processes. One of the primary purposes of AI and blockchain technology is to assist researchers in rethinking their company and competitive strategies. Researchers can get closer to their aim by combining AI and BT with VR and AR (Merugula et al., 2021).

The current century is known as the Industrial Revolution 4.0. I.R. 4.0, which includes concepts such as the Internet of Things (IoT), blockchain technology, and artificial intelligence (AI), plays an important role and is widely recognized as a successful model. This chapter discusses the role of AI in advancing manufacturing technologies in metaverse-based SMEs. This new AI technology, which includes VR and AR, is having an influence not only on the communication and computing environment, but also on the industry's evolving employment skill requirements. Without a doubt, industrial demands and academic fields are intricately related. Robotics and artificial intelligence have an impact on nanotechnology, drones, sensor technologies, and computer vision, and as a result, SMEs are becoming more active (Tsang & Lee, 2022; Brodny & Tutak, 2022).

To begin, an overview of the AI and blockchain technology enablers, as well as the four analytics capabilities, is offered. Finally, upcoming research and development subjects are explored, such as

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