Chapter 3
Business Model Innovation Through Immersive Technologies:
Integrating Digital Twins and the Metaverse in the Industry 5.0 Era

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ABSTRACT

Industry 5.0 drives a deeper fusion between advanced intelligent systems and human creativity, positioning immersive technologies as essential components of modern innovation. Digital Twins and the Metaverse enable highly interactive, data rich environments where physical processes can be simulated, optimized, and experienced virtually. With support from AI, IoT, blockchain, and high speed networks, organizations can design business models that prioritize adaptability, co creation, and meaningful user engagement. Consumers participate directly in virtual testing,

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collaborative design sessions, and service interactions, creating continuous feedback loops that refine products and experiences. These immersive ecosystems strengthen operational reliability, reduce development risks, and open opportunities for sustainable value creation across industries. By offering transparent, secure, and accessible digital spaces, immersive technologies help companies develop human centered, resilient, and future ready business strategies aligned with the goals of Industry 5.0.

1. INTRODUCTION

1.1 Industry 5.0 Landscape

Industry 5.0 represents a shift from the automation-driven efficiency of Industry 4.0 toward a human-centric, sustainable, and collaborative industrial paradigm. Rather than viewing technology as a substitute for human labor, Industry 5.0 frames digital systems as partners that augment human creativity, intuition, and ethical judgment. This "rehumanization of industry" elevates human-machine collaboration as a defining force of the new industrial era. This shift is transforming the relationships between producers, consumers, and stakeholders. In manufacturing, consumers increasingly act as co-creators, engaging in virtual prototyping and design processes that accelerate innovation and strengthen customer loyalty (Rudek et al., 2025). These interactive digital environments allow early testing and feedback, creating a more responsive innovation ecosystem (Sekti, 2025).

Public policies are also adjusting to accommodate this paradigm. Institutions such as the European Commission now emphasize that technology adoption must incorporate social values, sustainability, and ethical considerations not merely economic performance (Boopathy et al., 2025). Without proper governance frameworks, Industry 5.0 technologies risk deepening inequalities and limiting inclusive participation. This transition has significant implications for the research and innovation ecosystem. Academic and industrial stakeholders are beginning to move beyond traditional efficiency-oriented models toward more adaptive, human-centered business strategies. Preparing future professionals to navigate a labor market defined by human-machine collaboration is becoming equally essential.

1.2 The Role of Immersive Technologies

Immersive technologies including Digital Twins (DT), Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and the metaverse play a founda-