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The industrial metaverse (IMV), as an emerging ecosystem combining extended reality, digital twins, artificial intelligence, and blockchain, offers manufacturing supply chain (SC) actors a collective virtual environment. Within this environment, SC actors can build trust through sensory cues, such as visual cues and tone of voice, facilitating information and knowledge exchange (Guan et al., 2025). Therefore, IMV offers considerable potential to enhance supply chain resilience (SCR), which is defined as the adaptive ability to prepare for, respond to, recover from disruptions, and renew to a more desirable state. However, prior research has primarily examined IMV's initial potentials and adoption barriers, with limited attention to systematically identifying which IMV potentials support specific SCR capabilities (Queiroz et al., 2023).

This study addresses this gap by developing an evaluation framework linking IMV potentials to SCR capabilities in Chinese manufacturing contexts. Affordance theory provides the theoretical foundation for explaining how the materiality of industrial metaverse technologies, together with the goal-directed actions of SC actors, gives rise to IMV potentials that enhance SCR. Guided by this theoretical perspective, qualitative document analysis is conducted to identify the key IMV potentials for enhancing SCR. Finally, the Bayesian Best–Worst Method (Mohammadi & Rezaei, 2020), an expert-based weighting method, is used to determine the relative importance of the resulting SCR capabilities based on expert judgments.

In this presentation, I will introduce the IMV-SCR evaluation framework, discuss which technological components should be prioritised for investment, and share anticipated findings on how different components support specific SCR capabilities. Theoretically, this extends affordance theory into the domain of IMV-enabled SCR in manufacturing contexts. Practically, the framework provides manufacturers with actionable guidance for goal-driven IMV investment and informs solution providers in developing more targeted, resilience-oriented functionalities.

Keywords

Industrial metaverse ecosystem, Supply chain resilience, Multi Criteria Decision Making, Qualitative documentary analysis, Virtual environments

References

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