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Business Models in the Metaverse Era: Insights from Digital Transformation

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ABSTRACT

This study investigates the connection between the developing metaverse economy and digital transformation. Data from industry reports, case studies, and scholarly literature published between 2018 and 2025 were thematically examined using a qualitative descriptive methodology. Direct-to-avatar sales, tokenized asset ownership, experience-based revenue, hybrid digital–physical models, and B2B collaboration hubs are the five main metaverse business models identified by the findings. The study identifies challenges like high investment costs, technological limitations, regulatory uncertainties, and privacy concerns, as well as opportunities like new revenue streams, brand differentiation, global reach, and personalized customer experiences. The findings imply that long-term competitiveness in this dynamic field can be improved by incorporating metaverse projects into larger digital transformation plans, bolstered by collaborations and flexibility.

KEYWORDS: *Digital Transformation, Metaverse, Web 3.0, Immersive Technologies, Business Models.*

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INTRODUCTION

Digital transformation has become a central driver of innovation, reshaping how organizations create, deliver, and capture value in dynamic environments (Foss & Saebi, 2017; Wirtz et al., 2021). Enabled by technologies such as artificial intelligence (AI), cloud computing, blockchain, Internet of Things (IoT), and extended reality (XR), it extends beyond automation to reimagine business models and societal engagement (Lee et al., 2021). Within this trajectory, the *metaverse* has emerged as a persistent, shared, and immersive 3D environment that integrates physical and digital realities through avatars, interactive spaces, and interoperable economies (Stephenson, 1992; Markets & Markets, 2022).

Originating in speculative fiction (Stephenson, 1992), the metaverse now encompasses AR, MR, VR, digital twins, and decentralized asset ownership via NFTs (Lee et al., 2021). Its foundations—interactivity, ubiquity, interoperability, and scalability—are enabled by AI-driven personalization, blockchain-secured transactions, low-latency networking, and immersive display systems (Lampropoulos, 2025). Industry adoption is accelerating, with projections of growth from USD 61.8 billion in 2022 to USD 426.9 billion by 2027 at a CAGR of 47.2% (Markets & Markets, 2022). Applications span entertainment, retail, healthcare, education, industrial design, and public services (Hatami et al., 2025).

Recent developments underscore its commercial and societal potential. Meta's large-scale XR initiatives, Microsoft's USD 68.7 billion gaming acquisition, record-breaking Decentral and land sales, and civic programs like *Metaverse Seoul* illustrate diverse adoption paths (Kanterman & Naidu, 2021). AI underpins much of this evolution, powering infrastructure optimization, spatial computing, creator economies, and personalized user experiences (Radoff, 2021). Techniques such as convolutional neural networks (CNNs), recurrent neural networks (RNNs), generative adversarial networks (GANs), and NVIDIA's Omniverse enhance realism, avatar

interactivity, and immersive collaboration (Hua et al., 2020b; Ho et al., 2021; Moore, 2022).

Bibliometric analysis shows a 91.29% annual growth in AI–XR–Metaverse publications from 2015 to 2024, concentrated in healthcare, smart cities, manufacturing, and gaming, with IEEE, Elsevier, Springer, Wiley, and Taylor & Francis as leading publishers (Lampropoulos, 2025).

Despite the momentum, integrated academic synthesis of metaverse business models in the digital transformation context remains limited. This study addresses that gap by: (1) examining the interplay between digital transformation and the metaverse; (2) classifying emerging business models; and (3) exploring strategic opportunities, challenges, and governance implications for organizations entering this virtual economy.

Literature review

In order to investigate the metaverse as a transformative aspect of next-generation internet technologies, Rawat, El Alami, and Hagos (2024) carried out an extensive survey. They analyzed the architecture of the metaverse using a conceptual review methodology, outlining its essential features and specifications and emphasizing the significance of creating industry-wide standards for interoperability. The study evaluated the contributions, methods, and use cases of enabling technologies, including digital twins, ubiquitous computing, communication networks, interactive experiences, artificial intelligence, and cybersecurity. Applications from a variety of industries, including business, education, healthcare, industrial operations, and defense, were examined with an emphasis on both the technical difficulties and the possible advantages. The authors came to the conclusion that although the metaverse has many uses, resolving interoperability, security, and governance concerns through concerted stakeholder cooperation is necessary to fully realize its potential.

Using a focus on value creation and value capture in hybrid physical–virtual economies, Mancuso, Petruzzelli, and Panniello (2023) investigated how digital technologies are propelling business model innovation (BMI) in the metaverse. Gucci, Samsung, Hyundai, and Nike are four cross-industry incumbents that have strategically incorporated metaverse platforms into their business operations. The authors examined these companies using a multiple case study methodology. Three BM configurations are identified by their suggested framework: hybrid models, fully virtual-world models, and modified physical-world models. The results show that the adoption of the metaverse opens up new ways to capture value, like experience-based revenue and virtual product monetization, as well as new ways to create value, like immersive brand experiences, direct-to-avatar sales, and tokenized asset markets. According to Mancuso, Petruzzelli, and Panniello (2023), the study highlights that in order to successfully innovate metaverse BM, digital capabilities must be matched with immersive consumer engagement while navigating new issues with platform governance, interoperability, and intellectual property.

To describe how layered modular architectures in the metaverse allow for new value creation mechanisms, Ritala, Ruokonen, and Kostis (2024) created a metaverse flywheel model. The authors interviewed early metaverse adopters and innovators from a variety of industries in-depth using a qualitative interviewing methodology. Three key metaverse affordances were identified by the study: (1) prospection, or the capacity to model and predict future circumstances; (2) persistence, or the upkeep of editable and dynamic virtual environments; and (3) integration, or the smooth transitions between real and virtual worlds. According to the findings, creating value in the metaverse necessitates new organizing logics that go beyond previous, discrete 3D models and emphasize dynamic co-creation, user-driven content evolution, and hybrid physical–digital experiences. Organizations navigating digital transformation through the metaverse can benefit from the flywheel model, which emphasizes that sustained value arises from reinforcing cycles of engagement, innovation, and cross-environment integration (Ritala, Ruokonen, & Kostis, 2024).

In a global study on the value-creation potential of the metaverse, McKinsey & Company (2022) combined qualitative interviews with 13 senior leaders and domain experts with quantitative surveys of over 3,400 executives and consumers. Investment flows, adoption trends, and new business practices across industries were examined in the report. According to research, the metaverse could be worth up to USD 5 trillion by 2030, with the biggest effects seen in virtual learning, e-commerce, advertising, and gaming. Technological developments in XR and AI, changing consumer habits, and quickening capital inflows are important drivers. In order to gain an early-mover advantage, the study also determined that companies should develop their digital asset creation skills, try out immersive engagement models, and solve trust, privacy, and interoperability issues (McKinsey & Company, 2022).

In 2023, Vergara launched the first edition of the Special Issue "Virtual Reality and Metaverse: Impact

on the Digital Transformation of Society," which included a selection of review and research articles that examined how VR and the metaverse are being incorporated into social interaction, industry, and education. Methodologies ranged from empirical research using surveys, experiments, and case studies to systematic literature reviews. The abilities of virtual reality (VR) to improve immersive learning experiences, the metaverse's potential for collaborative virtual environments, and new issues like interoperability, data privacy, and user well-being were all highlighted in the contributions. To optimize the societal advantages of these technologies, the problem emphasized the necessity of interdisciplinary cooperation and the creation of technical, pedagogical, and ethical frameworks.

To increase transparency, verifiability, and efficiency in the construction industry, Cocco and Tonelli (2024) proposed a blockchain-based model that integrates Self-Sovereign Identity (SSI) and Building Information Modeling (BIM). They created a decentralized application for notarizing information flows in Common Data Environments (CDEs) using the Agile Blockchain DApp Engineering (ABCDE) methodology. The model uses a dual on-chain/off-chain architecture, with the off-chain subsystem handling hash computation and user interaction and smart contracts on the Ethereum blockchain managing file versioning, verification, and coordination processes. Results show that integrating blockchain with SSI reduces inefficiencies in information exchange, guarantees document authenticity, gives stakeholders control over data, and supports building lifecycle management through safe, impenetrable workflows.

The Special Issue on "Virtual Reality and Metaverse: Impact on the Digital Transformation of Society," edited by Vergara (2025), included six scientific studies and three review articles discussing the technological, societal, and educational facets of VR, AR, and the metaverse. These studies' methodologies included action research, mixed-methods surveys, user perception studies, and literature reviews (e.g., Mottura, 2024; Hatami et al., 2024; Lampropoulos, 2025). The increasing interest of society in social metaverse platforms, technological enablers like artificial intelligence (AI), edge computing, and 5G for real-time integration, and the wide-ranging possibilities of AI–XR convergence across industries were among the main conclusions. According to empirical research, VR can improve learning outcomes in higher education (Albarracin-Acero et al., 2024), socioeconomic contexts can affect VR adoption (Antón-Sancho et al., 2024), and AR can protect privacy (Cruz et al., 2025) and foster community engagement (Ranasinghe et al., 2025). When taken as a whole, these pieces highlight the transformative potential of VR/AR while simultaneously drawing attention to infrastructure, security, and ethical issues.

The economic and strategic ramifications of the developing metaverse were studied by Duch-Brown et al. (2024), who concentrated on how it might alter digital markets, competition, and innovation dynamics. The authors examined scenarios for the evolution of market structure using a conceptual and policy analysis methodology, emphasizing the ways in which large technology companies could consolidate control through platform, content, and infrastructure ecosystems. The metaverse raises issues with monopolistic practices, data governance, interoperability, and regulatory gaps, the study found, even though it also presents opportunities for immersive commerce, new business models, and improved consumer engagement. In order to guarantee competitive, inclusive, and user-centric metaverse development, the authors underlined the importance of proactive policy frameworks.

The state and future directions of digital business models were examined by Wirtz et al. (2021), who examined how value creation and capture are being altered by emerging technologies such as blockchain, artificial intelligence, and immersive environments like the metaverse. The authors developed an integrated framework for digital business model innovation by synthesizing research from various domains using a structured literature review methodology. The results show that new value propositions, ecosystem-based competition, and new governance issues are all fueled by technological convergence. In order to handle market disruptions and ethical issues in quickly changing digital ecosystems, the study emphasizes the significance of flexibility, cross-sector cooperation, and regulatory responsiveness.

Research Methodology

This study employs a qualitative, descriptive research methodology to examine the relationship between digital transformation and the emerging metaverse economy. Because of the novelty of the topic and the rapid development of immersive and Web 3.0 technologies, a descriptive synthesis was considered the best approach for mapping recent developments, identifying new business models, and characterizing strategic opportunities and challenges. Only secondary data is used in this study, which draws from white papers, industry reports, peer-reviewed academic publications, and case studies of metaverse

applications. These sources were chosen from reputable industry publications, academic databases, professional networks, and institutional repositories in order to strike a balance between scholarly rigor and industry relevance.

The sources were selected based on their relevance to both digital transformation and metaverse applications, with a focus on studies that offered in-depth discussion on business model innovation, strategic implications, or market impact. Only those materials that addressed one of the two domains without explicitly showing a connection between them, or that lacked a methodological basis, were excluded. The analysis employed thematic categorization and narrative synthesis to identify and include recurring themes such as virtual marketplaces, enterprise collaboration hubs, immersive consumer engagement, and digital asset monetization. This approach enabled the integration of diverse perspectives into a conceptually coherent understanding of the ways in which digital transformation impacts and influences the metaverse economy. The selection of the methodology is justified by the fact that, because of the lack of longitudinal data and experimental industry practices, metaverse research is still in its early stages and that qualitative synthesis is a helpful way to document the range of advancements and establish the framework for further empirical validation.

Findings

As part of the digital transformation, this study identified five primary business model types that are gaining traction in the metaverse. The first is direct-to-avatar (D2A) commerce, in which brands such as Samsung, Nike, and Gucci sell digital-only goods to avatars directly. This enables them to produce unique products, circumvent conventional supply chains, and establish novel connections with customers (Mancuso, Petruzzelli, & Panniello, 2023). The second is tokenized asset ownership, which makes use of blockchain technology to trade and sell virtual real estate and digital assets like NFTs on sites like The Sandbox and Decentraland. Although prices can fluctuate and regulations are still being developed, this provides transparency, royalties for creators, and the flexibility to transfer assets between platforms (Lee et al., 2021; Future Internet, 2025). The third is experience-based revenue, in which companies charge for the use of games, learning environments, or immersive experiences. These can be purchased through subscriptions or per-use fees, and they are frequently tailored with AI to keep users interested (McKinsey & Company, 2022; Vergara, 2025). The fourth is hybrid digital–physical models, which integrate the metaverse with real-world services, like VR for property tours, AR for retail, or digital twins for manufacturing (Ritala, Ruokonen, & Kostis, 2024). The fifth is B2B collaboration hubs, which are online spaces where businesses can use AI, IoT, and other cutting-edge technologies to design, test, and train together in real time (Rawat, El Alami, & Hagos, 2024).

Businesses can benefit from a number of strategic opportunities presented by the metaverse. Through asset sales, events, and virtual products, it can generate new revenue streams. Additionally, it can help brands differentiate themselves from rivals, particularly for early adopters who are viewed as trailblazers (Mancuso et al., 2023). By eliminating geographical restrictions, virtual spaces enable companies to connect with clients anywhere in the world (McKinsey & Company, 2022). Furthermore, highly customized customer experiences are made possible by AI tools in the metaverse, which can boost long-term value and foster loyalty.

But there are also major obstacles. The user experience may be less effective due to technological constraints like slow speeds, lack of interoperability, and high costs (Rawat et al., 2024; Hatami et al., 2025). Large expenditures in technology, intellectual property, and qualified personnel are also necessary to create immersive environments of a high caliber. There is still uncertainty surrounding legal and regulatory matters, such as taxation, virtual land regulations, and ownership rights for NFTs (Duch-Brown et al., 2024). Since the metaverse frequently gathers sensitive user data, including biometric information, privacy and data protection are top priorities (Hatami et al., 2025). Last but not least, the digital divide causes unequal access to the metaverse, with some communities lacking the gadgets or internet speeds required to engage (Vergara, 2025).

The findings imply that companies should not view the metaverse as an isolated experiment but rather as a component of their larger digital transformation strategy. Investments can be more successful if metaverse initiatives are in line with current tactics. Development can be accelerated and innovation risks can be shared by collaborating with technology providers. Businesses need flexible business models that can adjust to new technologies and market trends because the metaverse is changing so quickly. Instead of creating closed, isolated systems, success will probably depend on creating open, collaborative ecosystems that function across various platforms in the long run (Wirtz et al., 2021).

Conclusion

This study investigated how business models are being shaped by the metaverse as part of the larger digital transformation process. The results demonstrate that the metaverse is both a byproduct of digital maturity and a force for additional change, providing new avenues for value creation and acquisition for businesses. Direct-to-avatar commerce, tokenized asset ownership, experience-based revenue models, hybrid digital–physical models, and B2B collaboration hubs were the five primary business model types that were found. These models show how businesses are connecting with customers, enhancing operations, and entering new markets through immersive and decentralized technologies.

Clear opportunities were also identified by the analysis, including the creation of new revenue streams, the improvement of brand identity, the ability to reach audiences around the world, and the use of AI to provide individualized experiences. However, it also highlighted important obstacles, such as disparities in access to infrastructure, unclear regulations, high investment costs, privacy issues, and technological limitations. These elements demonstrate that although the metaverse has a lot of promise, its successful implementation necessitates thorough preparation and coordination with an organization's overarching digital transformation plan.

In conclusion, the metaverse is a rapidly changing, highly promising environment where creativity, teamwork, and flexibility are essential. Organizations that integrate metaverse initiatives into their broader digital transformation roadmaps, invest in partnerships, and remain flexible in their approach are more likely to succeed. The findings highlight the need for additional empirical research on the ROI, user adoption trends, and long-term viability of metaverse business models.

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