

Metaverse Entrepreneurship for Sustainable Development: Opportunities, SDG Linkages and Emerging Challenges

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Abstract: The rapid development of the Metaverse has opened new avenues for entrepreneurial activity through immersive environments, digital offerings, virtual services and emerging business models. At the same time, the Sustainable Development Goals (SDGs) offer a broad framework for addressing economic, social and environmental concerns. This study explores how Metaverse-based entrepreneurship relates to sustainable development by systematically reviewing secondary literature. The review examines emerging entrepreneurial opportunities, their relevance to selected SDGs, and the sustainability-related challenges that may influence their outcomes. Particular attention is given to areas including quality education, decent work and economic growth, and industry, innovation and infrastructure, together with concerns surrounding digital inequality, environmental effects, privacy, cybersecurity, accessibility and regulatory uncertainty. The study brings these dimensions together to develop an integrated understanding of the opportunities and limitations of Metaverse entrepreneurship in the context of sustainable development and the SDGs.

Keywords: Metaverse; Entrepreneurship; Sustainable Development; Sustainable Development Goals; Digital Entrepreneurship; Business Models; Sustainability.

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I. INTRODUCTION

The Metaverse represents an evolving digital ecosystem in which immersive technologies such as virtual reality (VR), augmented reality (AR), artificial intelligence (AI) and blockchain are increasingly being integrated. These technologies enable organisations to create alternative forms of customer interaction, service delivery and digital value creation. The development of these virtual environments has consequently expanded the scope for entrepreneurial activity and experimentation with new forms of products, services and business models.

The SDGs offer a comprehensive framework for addressing major economic, social and environmental priorities. In this context, the expanding application of Metaverse technologies has prompted growing interest in their possible role in sustainable development. Applications involving education, technological innovation, economic activity and digital services may create pathways through which entrepreneurial initiatives can support selected SDGs (Johri et al., 2024; Sharifi et al., 2025).

However, the Metaverse also presents challenges related to digital inequality, environmental impact, privacy,

cybersecurity, accessibility and regulation. These issues may affect the extent to which Metaverse-based entrepreneurial activities can contribute to sustainable development (Kostelić & Etinger, 2025; Raman et al., 2025).

Although existing research has examined the Metaverse from business, entrepreneurship and sustainability perspectives, these areas are not always considered together. Therefore, this study systematically reviews the existing literature to examine the entrepreneurial opportunities created by the Metaverse, their potential contribution to the SDGs, and the sustainability challenges associated with them.

The study uses secondary literature to develop an integrated understanding of the relationship between Metaverse entrepreneurship and sustainable development.

➤ Research Problem

The emergence of the Metaverse is creating new opportunities for businesses and entrepreneurs through technologies such as virtual reality, augmented reality, artificial intelligence and blockchain. These technologies are changing the ways in which businesses create value, deliver products and services, interact with customers and develop new business models.

At the same time, the Sustainable Development Goals (SDGs) provide a global framework for addressing economic, social and environmental challenges. The growing use of Metaverse technologies therefore raises an important question: can the entrepreneurial opportunities created by the Metaverse contribute to sustainable development?

Existing studies have examined the Metaverse from different perspectives, including technology, business and sustainability. However, the relationship between Metaverse entrepreneurship and the SDGs is not yet clearly understood. Previous research highlights potential opportunities in areas such as education, innovation and economic activity, while also pointing to challenges including digital inequality, environmental concerns, privacy, cybersecurity and accessibility.

Therefore, there is a need to systematically review the existing literature to understand the entrepreneurial opportunities emerging from the Metaverse, their potential contribution to the SDGs, and the sustainability challenges that may affect these contributions. This study addresses this need by bringing these aspects together through a systematic review of secondary literature.

➤ *Research Gap*

The Metaverse has received increasing attention in recent research, with studies examining its technological applications, business potential, entrepreneurship and contribution to sustainable development. Researchers have also explored the relationship between Metaverse technologies and different Sustainable Development Goals (SDGs). However, these areas have generally been examined from separate perspectives, and the relationship between Metaverse entrepreneurship and sustainable development is not yet clearly understood in an integrated manner.

Existing literature provides insights into the business opportunities and innovative potential of the Metaverse, as well as its possible contributions to areas such as education, economic development and technological innovation. At the same time, studies have identified concerns related to digital inequality, environmental impact, privacy, cybersecurity and accessibility. However, there is limited integration of these entrepreneurial opportunities, SDG contributions and sustainability challenges within a single review.

Therefore, the research gap identified in this study is the lack of an integrated review that brings together Metaverse-based entrepreneurial opportunities, their potential contribution to the SDGs, and the sustainability challenges associated with them. This study seeks to address this gap by systematically reviewing the existing secondary literature and developing an integrated understanding of the relationship between Metaverse entrepreneurship and sustainable development.

➤ *Research Questions*

The study is guided by the following research questions:

- RQ1. What entrepreneurial opportunities are emerging through the Metaverse?
- RQ2. Which Sustainable Development Goals (SDGs) are associated with Metaverse entrepreneurship?
- RQ3. In what ways can Metaverse entrepreneurship contribute to sustainable development?
- RQ4. What are the major sustainability challenges associated with Metaverse entrepreneurship?

➤ *Research Objectives*

The study aims to:

- To identify the entrepreneurial opportunities emerging through the Metaverse.
- To examine the Sustainable Development Goals (SDGs) associated with Metaverse entrepreneurship.
- To analyse how Metaverse entrepreneurship can contribute to sustainable development.
- To identify the major sustainability challenges associated with Metaverse entrepreneurship.
- To develop a conceptual understanding of the relationship between Metaverse entrepreneurship, sustainable development and the SDGs.

II. RESEARCH METHODOLOGY

➤ *Research Design*

This study uses a systematic literature review (SLR) to examine the relationship between Metaverse entrepreneurship and the Sustainable Development Goals (SDGs). The study is based on secondary data collected from published academic research and reliable institutional sources. A systematic review provides a structured way of identifying, organising and analysing the existing literature related to the research topic.

Previous studies have also adopted systematic review approaches to examine the relationship between the Metaverse and sustainable development. For instance, Johri et al. (2024) reviewed 66 studies using systematic literature review and bibliometric techniques, while more recent research has examined the potential benefits and trade-offs between the Metaverse and the SDGs.

➤ *Sources of Data*

The study is based on secondary data obtained from academic and institutional sources. Research articles, review papers and other scholarly publications related to the Metaverse, entrepreneurship, sustainability and the SDGs are considered for the review.

The literature search will focus mainly on recognised academic databases such as Scopus, Web of Science, ScienceDirect and Google Scholar. Relevant publications from credible organisations, particularly those dealing with

the Sustainable Development Goals, will also be considered where appropriate.

➤ *Search Strategy*

A structured search strategy will be used to identify literature relevant to the research questions. Different combinations of keywords will be used, including:

- “Metaverse” AND “Entrepreneurship”
- “Metaverse” AND “Sustainable Development Goals”
- “Metaverse” AND “Sustainability”
- “Metaverse” AND “Digital Entrepreneurship”
- “Metaverse” AND “Sustainable Business Models”
- “Metaverse” AND “SDGs”
- “Metaverse entrepreneurship” AND “sustainable development”

Additional keyword combinations may be used when required to identify studies that are relevant to the objectives of the study.

➤ *Search Process*

The literature search was conducted using the selected keywords and combinations across the identified academic databases. The search focused on studies addressing the Metaverse, entrepreneurship, sustainable development and the Sustainable Development Goals.

The results obtained from the different databases were compiled and checked for duplicate records before the screening process. The titles and abstracts of the identified studies were then examined to determine their relevance to the research questions. Potentially relevant studies were assessed further using the predefined inclusion and exclusion criteria.

The final set of selected studies was used for data extraction and thematic analysis. The search date, number of records identified, duplicates removed, studies screened and final studies included were recorded as part of the literature search and screening process.

➤ *Inclusion and Exclusion Criteria*

To maintain the relevance and quality of the review, specific inclusion and exclusion criteria were applied during the selection of studies.

• *Inclusion Criteria*

- ✓ Research articles and review papers related to the Metaverse, entrepreneurship, sustainability or the SDGs.
- ✓ Studies examining the economic, social, environmental or entrepreneurial aspects of the Metaverse.
- ✓ Relevant publications from credible academic and institutional sources.
- ✓ Studies published in English.
- ✓ Studies containing sufficient information to address one or more of the research questions.

• *Exclusion Criteria*

- ✓ Studies that are not relevant to the objectives of the study.
- ✓ Duplicate publications.
- ✓ Studies focusing only on the technical aspects of the Metaverse without a connection to entrepreneurship or sustainability.
- ✓ Unreliable websites and sources that do not provide adequate academic or institutional evidence.
- ✓ Publications that do not provide sufficient information for analysis.

➤ *Study Selection Process*

The literature selection was carried out in different stages. Initially, the titles and abstracts of the identified studies were examined to remove publications that were clearly unrelated to the research topic. The remaining studies were then assessed against the research questions and the inclusion and exclusion criteria. Studies that met the required criteria were selected for detailed analysis.

The study followed the principles of the PRISMA 2020 framework to provide a transparent approach to the identification, screening, eligibility assessment and final selection of relevant studies (Page et al., 2021).

The final number of studies included in the review was determined through the literature search and screening process.

➤ *Data Extraction*

Relevant information from the selected studies was recorded systematically to facilitate comparison and analysis. The information extracted will include:

- Author and year of publication
- Country or region of the study
- Research focus
- Research method
- Metaverse application or dimension
- Entrepreneurial opportunity
- Relevant SDG
- Potential contribution to sustainability
- Sustainability challenge
- Major findings

The extracted information was organised into a literature review matrix, which helped in identifying similarities, differences and emerging themes across the selected studies.

➤ *Data Analysis*

The selected studies were analysed using thematic analysis and descriptive synthesis. The findings were organised around the research questions and grouped into key themes.

The analysis focused on four major areas:

- Entrepreneurial opportunities emerging from the Metaverse
- The relationship between Metaverse entrepreneurship and the SDGs
- Economic, social and environmental contributions
- Sustainability challenges and barriers

The analysis helped identify common findings, emerging patterns, differences among studies and areas that require further research.

➤ *Conceptual Synthesis*

The findings from the reviewed literature were brought together to develop a conceptual understanding of the relationship between Metaverse entrepreneurship and sustainable development.

The study considered the relationship between Metaverse technologies, entrepreneurial opportunities, SDG contributions and sustainable development outcomes, while also recognising the challenges that may influence these outcomes.

III. LITERATURE REVIEW

➤ *Metaverse and Entrepreneurship*

The Metaverse has emerged as a developing digital environment that brings together technologies such as virtual reality (VR), augmented reality (AR), artificial intelligence (AI), and blockchain. These technologies are creating new ways for businesses to interact with customers, provide products and services, and develop innovative business models. As a result, the Metaverse is increasingly being considered not only from a technological perspective but also as an emerging space for entrepreneurial activity (Firmansyah & Umar, 2023).

The entrepreneurial dimension of the Metaverse has also led to the emergence of the concept of meta-entrepreneurship. Zhang and Siau (2024) conceptualised meta-entrepreneurship as a form of entrepreneurial activity that enables value creation across virtual and physical environments. Their framework highlights infrastructure, content and experience as important layers of Metaverse-based entrepreneurial activity.

➤ *Metaverse and Business Model Innovation*

The development of the Metaverse is also influencing the way businesses create, deliver and capture value. Immersive digital environments provide organisations with opportunities to develop new customer experiences and explore alternative approaches to business model development.

Latino et al. (2024) examined the relationship between the Metaverse and business model innovation through a systematic literature review. Their findings indicate that Metaverse technologies can influence value creation and value capture across different sectors.

Kostelić and Etinger (2025), based on a systematic review of 91 publications, identified scalability, technological adaptability, user engagement, ethical and sustainability practices, and economic viability as important dimensions of Metaverse business models. This suggests that entrepreneurs need to consider both business performance and sustainability when developing Metaverse-based models.

The literature therefore suggests that entrepreneurs may use the Metaverse to develop virtual marketplaces, digital products, immersive services, virtual events and creator-based businesses. However, the success of these business models depends on factors such as technological infrastructure, customer acceptance, investment, digital skills and responsible business practices.

➤ *Metaverse and Sustainable Development*

The relationship between the Metaverse and sustainable development has gained increasing attention in recent research. Johri et al. (2024) conducted a systematic review of studies examining the Metaverse in relation to sustainable development. Their analysis identified research themes related to the Metaverse ecosystem, sustainable society and sustainable learning.

The potential contribution of the Metaverse to sustainable development extends across different sectors. Virtual learning, digital twins, virtual tourism, cultural experiences and immersive services may provide alternative ways of delivering services and supporting collaboration. These applications can also create opportunities for entrepreneurs to develop new services that address economic and social needs (Johri et al., 2024; Raman et al., 2025).

However, the contribution of the Metaverse to sustainability should not be viewed only from the perspective of its potential benefits. The infrastructure required to operate immersive digital environments also creates environmental concerns. Raman et al. (2025) highlight the resource-intensive nature of Metaverse technologies and the need for sustainable design and energy-efficient approaches.

➤ *Metaverse and the Sustainable Development Goals*

The Sustainable Development Goals provide a useful framework for examining the contribution of emerging technologies to sustainable development. Recent studies have explored the relationship between Metaverse technologies and the SDGs.

Sharifi et al. (2025) examined the potential co-benefits and trade-offs between the Metaverse and the Sustainable Development Goals through a systematic review. Their findings show that existing research has focused particularly on SDG 3, SDG 4, SDG 9, SDG 11 and SDG 12.

The study also identified comparatively less attention to SDG 10, SDG 13, SDG 15 and SDG 17. This uneven distribution suggests that the relationship between the Metaverse and sustainable development has not been explored equally across all areas of the SDGs (Sharifi et al., 2025).

From an entrepreneurship perspective, these findings provide an opportunity to examine how Metaverse-based businesses and entrepreneurial activities may contribute to sustainable development. For example, virtual education may be associated with SDG 4, technological innovation with SDG 9, and new forms of economic activity with SDG 8.

➤ *Metaverse Entrepreneurship and Economic Development*

Economic development is one of the important areas through which Metaverse entrepreneurship may contribute to sustainable development. The emergence of virtual environments has created opportunities for entrepreneurs to develop new products, services and business models (Zhang & Siau, 2024).

Virtual marketplaces, digital products, immersive services and creator-based businesses represent emerging forms of economic activity. These developments may create opportunities for entrepreneurship, employment and income generation and may therefore be relevant to SDG 8: Decent Work and Economic Growth.

Latino et al. (2024) found that Metaverse technologies can influence value creation and value capture within business models. Similarly, Kostelić and Etinger (2025) highlight the changing nature of value creation, delivery and capture in Metaverse business models.

At the same time, access to technology, digital skills, investment and suitable infrastructure can influence who is able to participate in these emerging economic opportunities.

➤ *Metaverse Entrepreneurship and Innovation*

Innovation is another important connection between Metaverse entrepreneurship and sustainable development. The integration of VR, AR, AI, blockchain and other digital technologies provides entrepreneurs with tools for developing new products, services and business processes.

This area is closely related to SDG 9: Industry, Innovation and Infrastructure. Metaverse technologies can support experimentation, virtual product development, simulation and new forms of digital collaboration. These applications may provide entrepreneurs with opportunities to develop innovative solutions and business models (Latino et al., 2024; Zhang & Siau, 2024).

Therefore, innovation can provide entrepreneurs with new opportunities, but these opportunities depend on the availability of appropriate infrastructure, technological knowledge, investment and skills.

➤ *Metaverse Entrepreneurship and Education*

Education is another area in which Metaverse entrepreneurship may contribute to sustainable development. Virtual environments can support immersive learning, professional training, simulations and skill development. Entrepreneurs can use these opportunities to develop educational platforms and specialised learning services.

This has a direct relationship with SDG 4: Quality Education. Metaverse-based educational services may provide alternative learning experiences and create opportunities for new educational business models.

Johri et al. (2024) identified sustainable learning and education as important areas within the existing Metaverse literature. However, access remains an important consideration because Metaverse-based education requires suitable devices, internet connectivity and digital skills.

➤ *Metaverse Entrepreneurship and Social Inclusion*

Social inclusion is another important dimension when considering the relationship between the Metaverse and sustainable development. Virtual environments can provide opportunities for people to interact, participate in digital communities and access certain services regardless of their geographical location.

This has potential relevance to SDG 10: Reduced Inequalities. However, participation in Metaverse-based entrepreneurship requires access to devices, internet connectivity, digital literacy and financial resources. Individuals and communities without these resources may have limited opportunities to benefit from emerging digital markets.

Therefore, the Metaverse may create opportunities for inclusion while also creating the possibility of new forms of digital inequality (Sharifi et al., 2025).

➤ *Metaverse Entrepreneurship and Environmental Sustainability*

Environmental sustainability presents both opportunities and challenges for Metaverse entrepreneurship. Certain virtual activities may reduce the need for physical travel, physical events or some forms of material consumption.

However, Metaverse technologies also depend on digital infrastructure, computing power, electronic devices and energy. Raman et al. (2025) highlight the resource requirements associated with Metaverse technologies and the need for sustainable approaches to their development and use.

This creates an important distinction between the potential environmental benefits of virtualisation and the environmental costs of the technologies supporting virtual environments. Therefore, entrepreneurs need to consider resource efficiency, energy use and responsible technology adoption when developing Metaverse-based business models.

➤ *Metaverse Entrepreneurship and Sustainable Business Models*

Metaverse entrepreneurship is closely connected with the development of new and innovative business models. Virtual marketplaces, digital products, immersive services and virtual experiences provide entrepreneurs with opportunities to create and deliver value in different ways. The use of Metaverse technologies can also change how

businesses interact with customers and generate value (Latino et al., 2024; Zhang & Siau, 2024).

Kostelić and Etinger (2025), based on their systematic review of 91 publications, identified scalability, technological adaptability, user engagement, economic viability, and ethical and sustainability practices as important dimensions of Metaverse business models. These dimensions suggest that sustainable Metaverse entrepreneurship requires attention not only to business opportunities but also to the longer-term economic, social and environmental effects of these models.

From a sustainability perspective, Metaverse business models need to balance innovation and economic value with responsible technology use. Issues such as accessibility, privacy, digital inclusion and resource requirements can influence the sustainability of Metaverse-based entrepreneurial activities.

This perspective strengthens the connection between entrepreneurship, business model innovation and sustainable development, and provides a basis for examining how entrepreneurial activities in the Metaverse may contribute to the SDGs.

➤ *Sustainability Challenges of Metaverse Entrepreneurship*

Although the Metaverse provides several entrepreneurial opportunities, its development also presents challenges that may affect its contribution to sustainable development.

Digital Inequality: Access to appropriate devices, reliable internet connectivity and digital skills is necessary for meaningful participation in Metaverse environments.

Environmental Concerns: The infrastructure required to operate Metaverse applications can involve considerable energy and resource requirements. Raman et al. (2025) highlight the need for sustainable design and appropriate energy strategies.

Privacy and Cybersecurity: Metaverse platforms can involve the collection and processing of large amounts of user and behavioural data. These issues can influence consumer trust and business sustainability. Kostelić and Etinger (2025) identify privacy, cybersecurity and data-related concerns as important aspects of Metaverse business models.

Regulation and Governance: The development of Metaverse technologies creates challenges relating to data protection, intellectual property, digital identity, virtual assets and consumer protection. Governance and legal considerations therefore need to be considered alongside business development (Kostelić & Etinger, 2025).

Accessibility: Accessibility is another important concern. If accessibility is not addressed, some groups may have limited opportunities to participate in Metaverse-based activities.

➤ *Overall Synthesis of the Literature*

The literature indicates that the Metaverse is developing as an emerging environment for entrepreneurship, business model innovation and digital service delivery. Existing studies suggest that Metaverse technologies can create new opportunities for value creation, customer engagement and innovative business models (Firmansyah & Umar, 2023; Latino et al., 2024; Zhang & Siau, 2024).

Research on sustainable development also indicates that the Metaverse has potential connections with several SDGs, particularly those related to education, innovation, health, sustainable cities and responsible consumption (Johri et al., 2024; Sharifi et al., 2025). At the same time, concerns related to digital inequality, environmental impact, privacy, cybersecurity and accessibility highlight the need to consider both opportunities and limitations.

Overall, the literature shows that Metaverse entrepreneurship, sustainable development and the SDGs are closely related but are not always examined together. The present study therefore brings these perspectives together through a systematic review of the existing secondary literature.

IV. FINDINGS AND ANALYSIS

➤ *Entrepreneurial Opportunities in the Metaverse*

The reviewed literature shows that the Metaverse is creating opportunities for entrepreneurs to develop new products, services and business models. Virtual commerce, digital products, immersive education, virtual events, tourism and creator-based activities represent emerging areas of entrepreneurial activity (Zhang & Siau, 2024; Kostelić & Etinger, 2025).

These opportunities indicate that Metaverse entrepreneurship is not limited to transferring existing businesses into virtual environments. It also provides possibilities for new forms of value creation, customer engagement and digital service delivery.

➤ *Relationship Between Metaverse Entrepreneurship and the SDGs*

The literature indicates that Metaverse technologies have potential relationships with several Sustainable Development Goals (SDGs). Research has particularly examined SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 12 (Responsible Consumption and Production) (Sharifi et al., 2025).

From an entrepreneurship perspective, these areas provide opportunities for developing innovative products and services. For example, virtual learning can be associated with SDG 4, technology-based innovation with SDG 9, and new digital services with broader economic and social development.

However, the relationship between the Metaverse and the SDGs also involves trade-offs. Sharifi et al. (2025) highlight that comparatively less attention has been given to areas such as SDG 10 (Reduced Inequalities), SDG 13 (Climate Action), SDG 15 (Life on Land), and SDG 17 (Partnerships for the Goals). This indicates that the sustainability contribution of the Metaverse needs to be examined across both its potential benefits and limitations.

➤ *Contribution to Economic Sustainability*

Metaverse entrepreneurship can contribute to economic sustainability by creating new markets, products, services and business models. Entrepreneurs can use virtual environments to reach customers beyond geographical boundaries and explore new forms of value creation and value capture (Zhang & Siau, 2024; Latino et al., 2024).

The literature on Metaverse business models also highlights economic viability as an important consideration. Kostelić and Etinger (2025) identify economic viability alongside scalability, technological adaptability, user engagement, and ethical and sustainability practices as important dimensions of Metaverse business models.

However, access to technology, investment, digital skills and suitable infrastructure can influence participation. Therefore, the economic opportunities created by Metaverse entrepreneurship may not be equally accessible to all entrepreneurs.

➤ *Contribution to Social Sustainability*

The literature suggests that the Metaverse may contribute to social sustainability through education, training, communication, virtual communities and other forms of digital interaction. Johri et al. (2024) identified sustainable learning and sustainable society as important themes in their systematic review of Metaverse and sustainable development research.

Metaverse-based educational and training services may provide entrepreneurs with opportunities to develop new learning platforms and services. These applications are particularly relevant to SDG 4: Quality Education.

At the same time, access to suitable devices, internet connectivity and digital skills remains an important consideration. Differences in access may limit participation and create new forms of digital inequality.

➤ *Contribution to Environmental Sustainability*

The environmental dimension of Metaverse entrepreneurship involves both potential benefits and challenges. Virtual meetings, events and experiences may reduce the need for certain physical activities and travel.

However, Metaverse applications require computing systems, networks, electronic devices and other digital infrastructure. Raman et al. (2025) highlight the resource and energy requirements associated with Metaverse technologies and the need for more sustainable and energy-efficient approaches.

Therefore, the environmental contribution of Metaverse entrepreneurship cannot be assessed only in terms of reduced physical activity. The environmental costs associated with the infrastructure supporting virtual environments also need to be considered.

➤ *Major Sustainability Challenges*

The reviewed literature identifies several challenges that may influence the sustainability of Metaverse entrepreneurship. These include digital inequality, technological and infrastructure requirements, energy consumption, privacy, cybersecurity, regulatory uncertainty, accessibility and limited digital skills (Kostelić & Etinger, 2025; Raman et al., 2025).

Digital inequality may prevent some individuals and businesses from participating in Metaverse-based opportunities. Environmental concerns arise from the energy and resources required to support digital infrastructure. Privacy and cybersecurity issues may affect user trust, while regulatory uncertainty can create difficulties for businesses operating in emerging virtual environments.

These challenges indicate that technological development alone does not guarantee sustainable outcomes. Economic opportunities need to be considered together with social, environmental and governance-related factors.

➤ *Overall Findings*

The reviewed literature indicates that the Metaverse is emerging as a new environment for entrepreneurship, business model innovation and digital service delivery. It provides opportunities for virtual commerce, digital products, immersive services, education, virtual experiences and new forms of customer engagement (Firmansyah & Umar, 2023; Latino et al., 2024; Zhang & Siau, 2024).

The literature also establishes potential relationships between Metaverse technologies and several SDGs, with considerable research attention directed towards health, education, innovation, sustainable cities and responsible consumption (Johri et al., 2024; Sharifi et al., 2025).

At the same time, the literature identifies important sustainability challenges, particularly digital inequality, environmental impact, privacy, cybersecurity, accessibility and governance. These challenges may influence the extent to which entrepreneurial opportunities in the Metaverse translate into sustainable development outcomes.

Overall, the reviewed literature supports the view that Metaverse entrepreneurship has the potential to contribute to sustainable development, but this contribution is not automatic. It depends on how technologies and business models are developed, accessed and governed.

V. DISCUSSION

The reviewed literature shows that the Metaverse is creating new opportunities for entrepreneurship through virtual commerce, digital products, immersive education,

virtual events and other digital services. These developments can support new forms of value creation, customer engagement and business model innovation (Firmansyah & Umar, 2023; Latino et al., 2024; Zhang & Siau, 2024).

The literature also indicates potential relationships between Metaverse entrepreneurship and several Sustainable Development Goals (SDGs). Research has particularly examined SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 12 (Responsible Consumption and Production) (Sharifi et al., 2025). From an entrepreneurship perspective, these areas provide opportunities for developing innovative products, services and business models.

At the same time, these opportunities are accompanied by several challenges. Digital inequality, limited digital skills, environmental impact, privacy, cybersecurity, accessibility and regulatory uncertainty may restrict the benefits of Metaverse entrepreneurship. Business model research also highlights the importance of ethical and sustainability practices alongside technological adaptability, user engagement and economic viability (Kostelić & Etinger, 2025).

The environmental dimension requires particular attention. While some virtual activities may reduce the need for physical activities and travel, the infrastructure supporting Metaverse technologies requires computing resources, electronic devices, networks and energy. Raman et al. (2025) therefore highlight the need for sustainable design and energy-efficient approaches.

The literature also supports the research gap identified in this study. Previous research has examined the Metaverse from business, entrepreneurship and sustainable development perspectives, but these perspectives are not always brought together. The present study therefore connects Metaverse entrepreneurship, sustainable development, SDGs and sustainability challenges to provide an integrated perspective.

Overall, the literature suggests that Metaverse entrepreneurship can be a potential enabler of sustainable development rather than an inherently sustainable form of entrepreneurship. Its contribution to the SDGs will depend on inclusive access, responsible business practices, suitable infrastructure and appropriate management of its economic, social and environmental impacts.

➤ *Conceptual Framework*

The conceptual framework developed from the reviewed literature shows the relationship between Metaverse technologies, entrepreneurship and sustainable development. Metaverse technologies create new entrepreneurial opportunities through digital products, virtual services, immersive experiences and innovative business models. These opportunities can generate economic, social and environmental outcomes that may contribute to relevant Sustainable Development Goals (SDGs).

At the same time, challenges such as digital inequality, environmental impact, privacy, cybersecurity, accessibility and regulatory uncertainty may influence these outcomes. Therefore, the framework considers both the potential contributions and sustainability challenges associated with Metaverse entrepreneurship.

The framework can be represented as:

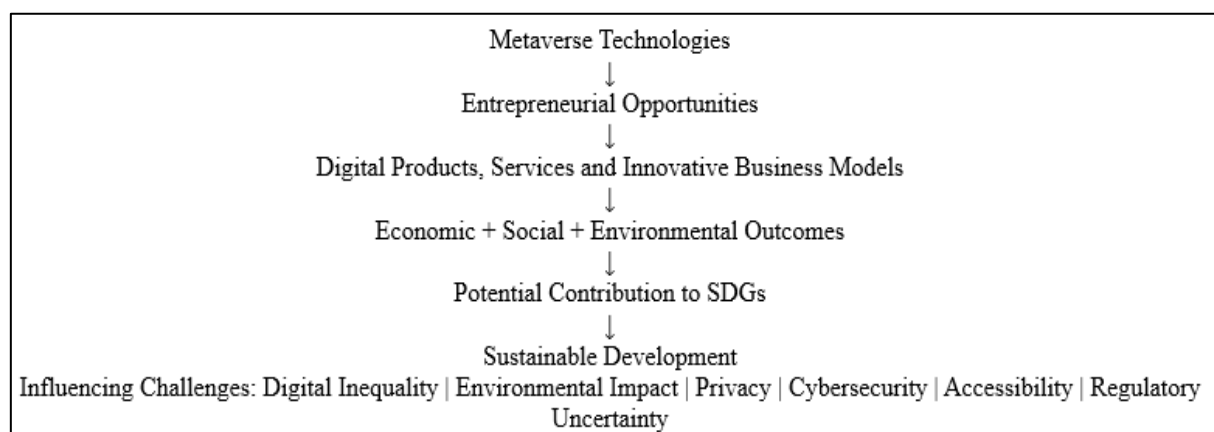


Fig 1 Conceptual Framework

VI. IMPLICATIONS

➤ *Theoretical Implications*

This study brings together the literature on Metaverse entrepreneurship, sustainability and the SDGs. It provides an integrated view of how Metaverse-based entrepreneurial activities may contribute to economic, social and environmental sustainability. The study also highlights the

need to consider both opportunities and challenges when examining the sustainability potential of the Metaverse.

The study further connects entrepreneurial opportunities, business model innovation and sustainable development, providing a broader perspective for understanding Metaverse entrepreneurship in the context of the SDGs.

➤ Practical Implications

The literature provides useful insights for entrepreneurs, businesses and policymakers regarding the opportunities and sustainability challenges associated with Metaverse-based activities. Entrepreneurs can explore new digital business models while considering issues such as accessibility, digital inclusion, privacy and environmental impact.

Businesses can also consider sustainability and responsible technology use when designing and implementing Metaverse-based products and services. Policymakers can focus on creating an enabling environment that supports innovation while promoting the responsible, accessible and inclusive use of Metaverse technologies.

➤ Challenges

Metaverse entrepreneurship faces several challenges that may limit its contribution to sustainable development. Digital inequality and limited digital skills can restrict participation, particularly for individuals and small businesses with limited access to technology and suitable infrastructure.

Environmental concerns may also arise from the energy and resources required to support Metaverse infrastructure. In addition, privacy and cybersecurity risks, accessibility issues and regulatory uncertainty can affect user participation, trust and business development.

Addressing these challenges is necessary to ensure that Metaverse-based entrepreneurial opportunities contribute to sustainable and inclusive development. Therefore, entrepreneurs, businesses and policymakers need to consider economic opportunities together with the social, environmental and governance dimensions of Metaverse development.

VII. CONCLUSION

This study reviewed the existing literature on Metaverse entrepreneurship and sustainable development and examined its relationship with the Sustainable Development Goals (SDGs). The literature indicates that the Metaverse is creating new opportunities for entrepreneurship through digital products, virtual services, immersive experiences and innovative business models.

The review also indicates that Metaverse technologies have potential connections with several SDGs, particularly in areas such as quality education, health, technological innovation, sustainable cities and responsible consumption. At the same time, the literature highlights challenges related to digital inequality, environmental impact, privacy, cybersecurity, accessibility and regulatory uncertainty.

Overall, Metaverse entrepreneurship has the potential to support sustainable development, but it cannot be considered inherently sustainable. Its contribution will depend on how entrepreneurs and businesses develop and use Metaverse technologies, the accessibility of digital opportunities,

responsible business practices, suitable infrastructure and effective management of economic, social and environmental impacts.

The study therefore highlights the need to view Metaverse entrepreneurship and sustainability together, rather than considering technological and economic opportunities separately from their wider social and environmental consequences.

VIII. LIMITATIONS

This study is based on secondary literature and therefore depends on the availability, coverage and quality of existing research. Since the Metaverse is still developing, the available literature may not fully capture its long-term entrepreneurial, economic, social and environmental impacts. The study is also limited to publications that meet the selected inclusion and exclusion criteria and therefore may not represent all research available on the topic.

FUTURE RESEARCH

Future studies can examine Metaverse entrepreneurship using primary data from entrepreneurs, businesses and users to better understand their experiences, opportunities and challenges. Further research can also examine specific SDGs, industries and geographical contexts in greater detail. Longitudinal studies may help assess the long-term economic, social and environmental impacts of Metaverse-based entrepreneurship and provide a better understanding of how these impacts change as Metaverse technologies develop.

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