



The Impact of Blockchain Technology and Digital Currency on the Gaming Industry in the Metaverse: A Holistic Study of the Potential Transformations in this Industry with Blockchain Technology in the Metaverse

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ABSTRACT

Objective: This research aims to investigate the emergence of blockchain and its impact on the metaverse gaming industry. The study addresses this issue from two dimensions: "Benefits of this technology for gaming" and "Related technologies in the metaverse gaming industry."

Method: The research is a systematic review. Initially, we reviewed 12 articles and 20 websites of reputable gaming companies. Then, in four stages and excluding unrelated sources, 3 articles and 7 websites were selected and analyzed from 2019 to 2022. We extracted all aspects related to blockchain, metaverse, and gaming.

Conclusion: The metaverse holds immense potential for transforming the gaming industry; 97% of gaming industry observers believe that gaming revolves around the metaverse today. Additionally, integrating the metaverse with gaming combines intermediary technologies of this industry, such as artificial intelligence, the Internet of Things, and blockchain-based cryptocurrency chains. This integration accelerates online asset trading in the virtual space with high security and rapid transfer, potentially creating thousands of job opportunities. Overall, digital currencies have the potential to revolutionize the gaming industry. An abstract not exceeding 300 words should appear on the top of the first page, after the title of the paper in a section titled "ABSTRACT" (without section number), after the names of the authors.

KEYWORDS: Gaming, Metaverse, Digital Currency, Blockchain Cryptocurrencies, NFTs.

1 INTRODUCTION

Metaverse

The term "metaverse," a compound word made from "meta," meaning beyond and "universe," can be translated as "beyond-worldly." This term was first used in Neal Stephenson's 1992 science fiction novel "Snow Crash." If put simply, the concept is the three-dimensional version of the internet. Metaverse can be described as a type of digital transaction that, through virtual experiences, can simulate the natural world in a connected manner [1]. Stephenson used the term metaverse to describe a virtual reality where the protagonist interacts, purchases, and even defeats enemies from their real-world avatars.

Digital Currency

In recent years, a new technology called digital currency, or, in other words, encrypted currency, has emerged. Digital currency is a type of decentralized digital money designed for internet use. Its start dates back to 2008; Bitcoin was the first digital currency and remains the largest, most influential, and most recognizable. A decade later, Bitcoin and other digital currencies like Ethereum have grown as digital alternatives to government-issued currencies.

Among the most well-known digital currencies after Bitcoin are Ethereum, Litecoin, IOTA, Polkadot, and more. Some digital currencies structurally resemble Bitcoin, while others utilize various technologies, giving them new features that extend beyond value transfer. Digital currencies enable value transfer online without intermediaries like banks or payment processors, facilitating global value transfer at any time at high speed and low cost [2].

Gaming in the Post-Metaverse Era

Recent developments in the gaming industry have led to the creation of games based on the metaverse concept. Players enter the metaverse to experience next-generation games. Characters in metaverse games are customized through unique avatars, representing virtual displays of real-world traits and personalities. These characters live within the metaverse as people do in the real world. Metaverse-based games are built on "play to earn," allowing players to acquire virtual in-game items and sell them for real-world money. Essentially, players can sell their digital assets (NFTs), such as clothing, weapons, etc., designed for the character using digital currency [3].

This research aims to explore gaming and digital currency topics in the metaverse comprehensively. After briefly introducing the metaverse technology and its effective influence on the gaming industry, the study adopts a comprehensive approach to reviewing the background of studies in this field using a transdisciplinary method. The transdisciplinary approach offers an opportunity to retrospectively review a hidden collective insight in a set of studies often captured through samples, techniques, and different theories [1].

2 MATERIALS AND METHODS

The present study employed an integrative approach to systematically investigate prior research on the metaverse and game development. A systematic review is a methodical approach to identifying, evaluating, and interpreting past research related to a research question, topic area, or phenomenon of interest (Agbo et al., 2019; Ali et al., 2020). These reviews offer an opportunity to retrospectively examine and synthesize collective insights hidden within a body of often diverse research, utilizing various samples, methods, and theories (Hanafizadeh et al., 2013).

To gain a comprehensive understanding of all dimensions within a scientific field, new methodological approaches like meta-studies (meta-analysis, metasynthesis, and metaintegration) have been suggested. Meta-analysis is employed to examine, combine, and diagnose previous studies and analyze their findings. Meta-analysis is a quantitative method relying on quantitative data and statistical approaches to the selected subject, while metasynthesis focuses on qualitative studies. Qualitative metaintegration is a type of qualitative study that utilizes information and findings extracted from other studies.

Considering the broad range of applications, benefits, and challenges of the metaverse, as well as the utilization of qualitative methods in most existing articles, metaintegration was chosen as a suitable method to comprehensively understand the metaverse and its impacts on game

development. In order to execute metaintegration based on selected articles, various methods are available, and in this research, the seven-step method proposed by Sandelowski and Barroso (2007) was employed.

In the initial step of this method, after identifying and determining the topic, research questions are defined, followed by a systematic review of the background and previous research. The retrieved articles are examined in terms of title, abstract, and content, and irrelevant articles and reports are removed. For instance, in some articles of this research, the author's identity (university and country) was unclear, and several articles were dated back to 2019 and earlier. Considering that blockchain and cryptocurrency research has expanded in the past three years and interactions between the metaverse and the cryptocurrency industry have been explored in recent studies, including their impacts on industries like game development, it can be concluded that the information related to previous years is redundant and does not address the goals of cryptocurrencies and the metaverse's impacts on the game industry. These articles were excluded during the review process.

Overall, based on the Sandelowski method, a detailed review of article abstracts was conducted to classify appropriate categories for distinguishing various concepts in the metaverse and game development literature. After reviewing article titles and abstracts, a comprehensive list of one hundred sources was compiled, and the texts of these articles served as data to answer the research question. Information from a hundred articles and forty reputable sources related to game development companies and digital currency owners was extracted and classified after analysis. Table 1 provides the criteria for selecting relevant sources and databases.

Table 1: Criteria for Source Selection and Relevant Databases

Databases and Information Sources	Criteria for Article Identification	Criteria for Excluding Identified Articles	Search Keywords	Number of Articles
<ul style="list-style-type: none"> - Google Scholar - ScienceDirect - Applied Science - IEEE - Springer - Academia - Elsevier - ProQuest - Emerald - ReSearchGate 	<ul style="list-style-type: none"> - Title of the article - Abstract of the article - Keywords of the article - Article content 	<ul style="list-style-type: none"> - Inaccessible full-text (especially for 2022 articles) - Poor and unreliable journal articles - Articles with title-text mismatch - Small-sized articles 	<ul style="list-style-type: none"> - Effects of Metaverse on gaming industry - Evolution of Cooperation in Meta-Rewards - Games on Networks of WS and BA models - Metaverse and games of Information Systems 	100

Refinement and Selection Process of Articles

All the articles for this study were gathered from databases, including Google Scholar, ScienceDirect, Association for Computing Machinery (ACM), Emerald, and Elsevier, covering the years from 2019 to 2021. The refinement stages proposed by Mir et al. (2020) were employed in this research. These stages are outlined as follows:

1. Refinement of articles with at least six pages written in languages other than Persian and English.
2. Exclusion of articles published in unreliable journals and conferences.
3. Removal of specific surveys from unreliable sources.
4. Elimination of impurities.
5. Filtering based on title and abstract.
6. Elimination of redundant versions.
7. Filtering based on full text.

Through searches conducted in the databases mentioned above, a total of one hundred sources (sixty articles and forty reports from reputable gaming websites) were collected as the database for examination. Of these, sixty articles were excluded due to a lack of alignment between their titles and the research topic. Subsequently, the abstracts of forty articles were meticulously reviewed. Thirty-six articles were rejected in this phase due to a lack of alignment between their abstracts and the research objectives. After thoroughly reviewing these texts, three articles and seven official and reputable websites were chosen for information analysis.

3 FINDINGS

Recent metaverse developments have compelled gaming companies to venture into creating metaverse-based games. Developers of these games utilize cutting-edge technologies such as blockchain and the Internet of Things to enhance the gaming experience.

Blockchain and Cryptocurrencies

Blockchain technology contributes to the development of the distributed metaverse project. This technology offers advantages such as digital ownership proof, value transfer, digital collectibility, and interaction capabilities [6]. Cryptocurrencies, serving as real-world money, enable users to exchange values in the three-dimensional metaverse environment. Another advantage that cryptocurrencies can bring to the metaverse and gaming is "decentralization." The decentralization of digital currencies implies that no bank or other institution can interfere with the structure of cryptocurrency and its transactions. This mechanism is designed to function effectively without their presence, allowing players in this secure environment to rapidly engage in the trading of their digital assets. [7]

Internet of Things (IoT)

The metaverse can utilize the Internet of Things to collect and employ data from the real world. This feature can connect the virtual metaverse to numerous devices in the real world, allowing objects in the metaverse to adjust their functions according to changes in weather or atmosphere.

Mathematical Relationships Used in Digital Currency

Digital currencies commonly employ blockchain technology. Here are several critical mathematical relationships used in digital currencies and blockchain:

- **Hash Algorithms:** These algorithms use hash encryption to ensure security in the blockchain. An example of a well-known hash algorithm is SHA-256.
- **Digital Signature Algorithms:** Digital currencies use digital signature algorithms to validate transactions and electronic signatures. An example is ECDSA (Elliptic Curve Digital Signature Algorithm).
- **Cryptography Algorithms:** Cryptography algorithms are used to protect information in blockchain and perform transactions. These algorithms include AES (Advanced Encryption Standard) and RSA (Rivest–Shamir–Adleman, a secure communication algorithm).
- **Mining Algorithms:** Proof of Work (PoW) mining algorithms are used in blockchain networks to create blocks and ensure security. For instance, Bitcoin uses the SHA-256 algorithm.
- **Consensus Algorithms:** Consensus algorithms are used to make decisions about changes in blockchain and validate transactions. Proof of Work (PoW) is one well-known example of a consensus algorithm.[8]

4 CONCLUSION

It must be acknowledged that the fundamental nature of radical digital currencies has yet to be fully explored. Therefore, theoretical and conceptual discussions and research must continue along this path. The present study can serve as a source of inspiration for future work. Insights derived from digital currencies contribute to shaping the architecture of this technology within organizations, communities, and the gaming industry. Since this research aims to introduce the broader dimensions of digital currency technology in the metaverse, in-depth examinations of each size and at various levels have been delegated to other researchers.

Gaming has taken center stage in the metaverse. Furthermore, integrating the metaverse with gaming has led to the convergence of intermediary technologies in this industry, such as artificial intelligence, the Internet of Things, and blockchain technology with cryptocurrencies. This convergence accelerates online asset trading in the virtual space with high security and rapid transfer, potentially creating thousands of job opportunities and triggering a significant revolution in gaming. [9]

Digital currencies, as virtual monetary units, can impact the metaverse in various ways, including:

- **E-commerce:** Digital currencies, especially encrypted ones, facilitate instant and direct payments among users. This can enhance items and services' buying and selling experience within metaverse games.
- **Internal Game Economy:** By integrating digital currencies into metaverse games, their internal economies can become independent from the real economy. This empowers game developers to create internally robust and sustainable games.
- **Exclusive Item Creation:** Blockchain technology allows developers to create unique and rare in-game items. Users may purchase these items using digital currencies, thereby increasing the value proposition of these games.

- **Exclusive Scoring and Rankings:** Through digital currencies, game developers can establish innovative scoring and ranking systems linked to player transactions, enhancing players' engagement.
- **User Economy Development:** Various digital tokens and badges can encourage economic interactions among users, creating distinct values and motivations for participants within the metaverse.
- **Security and Data Control:** Blockchain technology can play a significant role in enhancing the security of games and controlling user data, thereby increasing user trust in the metaverse and its games.

While digital currencies and blockchain technology can offer intriguing possibilities for the metaverse and gaming, a deeper study and more extensive market analysis are still necessary to fully understand their impacts and potential weaknesses within this industry. Moreover, concerns regarding safety, privacy, supervision, and potential vulnerabilities must also be seriously examined [10].

REFERENCES

- [1]:<https://virgool.io/GameWorld/%D8%BA%D9%88%D9%84-%D9%87%D8%A7%DB%8C-%D8%B5%D9%86%D8%B9%D8%AA-%D8%A8%D8%A7%D8%B2%DB%8C-%D8%B3%D8%A7%D8%B2%DB%8C-ofb3beoig4f>
- [2]:<https://venturebeat.com/metaverse/52-of-u-s-gamers-believe-the-metaverse-will-change-the-game-industry/>
- [3]:<https://www.investopedia.com/articles/investing/053115/how-video-game-industry-changing.asp>
- [4]:Agbo, C.C., Mahmoud, Q.H. & Eklund, J.M. (2019). Block chain Technology in Healthcare: Systematic Review. *Healthcare*, 56(7). DOI: doi.org/10.3390/healthcare7020056.
- [5]:Hanafizadeh, P., Keating, B.W. & Khedmatgozar, H. (2014). A Systematic Review of Internet Banking Adoption. *Telematics and Informatics*, 31(3).
- [6]:<https://www.facebook.com/business/news/insights/what-unprecedented-growth-means-for-the-future-of-the-gaming-industry>
- [7]:<https://www.intelligenthq.com/the-effect-of-the-metaverse-on-the-gaming-industry/>
- [8]:<https://plarium.com/en/blog/meta-in-gaming/>
- [9]:https://www.ey.com/en_us/tmt/what-s-possible-for-the-gaming-industry-in-the-next-dimension/chapter-3-insights-on-the-metaverse-and-the-future-of-gaming
- [10]:<https://cyberscrilla.com/metaverse-pros-and-cons-the-top-benefits-and-drawbacks/>