Decentralized Autonomous Organizations Market Meta Analysis.

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Abstract

Decentralized Autonomous Organizations (DAOs) represent a transformative approach to governance and decision-making, driven by technology that enables decentralized, transparent, and direct stakeholder participation. DAOs are disrupting traditional centralized models across various industries. For instance, they offer alternatives to conventional banking and investment systems by facilitating decentralized asset management and peer-to-peer transactions. In the insurance sector, DAOs streamline claims processing, reduce fraud, and enhance risk assessment accuracy. They also provide solutions to combat misinformation and censorship through community-driven news platforms.

However, several challenges and open questions persist for DAOs. Key issues include the need to establish standardized governance mechanisms to ensure fairness, security, and accountability. Additionally, scalability concerns, legal frameworks, and interoperability between different DAOs are critical areas requiring further exploration and development.

This monograph presents an analysis of the DAO marketplace that utilizes a dataset of 50 DAOs selected by the assets size in their treasuries across different industries. Through descriptive statistics and comprehensive analysis, the monograph identifies trends in DAO industries and highlights governance and other shortcomings in the evolving landscape of DAOs.

Keywords: Decentralized autonomous organization, cryptocurrencies, blockchain, DLT, distributed systems, governance, distributed ledger technology, regulation, protocols, optimization, principal-agent.

1. Introduction

Decentralized Finance (DeFi) and Non-Fungible Tokens (NFTs) are two recent developments in the field of blockchain technology and crypto assets. DeFi represents an open financial system built on block-chain infrastructure, offering decentralized, transparent, and trustless financial services. By relying on distributed ledgers and smart contracts, DeFi aims to provide accessible and efficient alternatives to traditional financial systems, eliminating the need for intermediaries such as banks (Ante, 2021; Chen & Bellavitis, 2019; Scha¨r, 2021). Since its emergence, the DeFi market has witnessed exponential growth characterized by the creation of decentralized applications (dApps), new business models, and digital platforms that promise to democratize access to financial services.

Parallel to the rise of DeFi, NFTs, arguably one aspect of the DeFi market, have gained substantial attention as a means of establishing unique digital ownership. NFTs are essentially digital certificates stored on a blockchain, representing ownership of a particular digital or even physical asset, which is unique and non-replicable. NFTs have been applied across diverse domains, ranging from digital art and music to collectibles and intellectual property, providing a mechanism for crea- tors to establish provenance and scarcity in an increasingly digital world (Ante, 2022; Wilson, Karg, & Ghaderi, 2021). This technology has garnered attention not only for its role in empowering artists and con- tent creators but also for facilitating new economic models in the digital realm. High-profile sales, such as the Beeple artwork auctioned for $69.3 million in 2021 (Christie's, 2021), have underscored the growing cultural and economic significance of NFTs, attracting both scholarly in- terest and entrepreneurial ventures.

The evolution of DeFi and NFTs highlights a shift towards more decentralized and community-driven models of finance and ownership. DeFi, by enabling a

permissionless and transparent ecosystem, allows for financial products and services to be accessed without centralized con- trol. Similarly, NFTs are redefining digital property rights, offering a pathway for creators to directly manage, monetize, and transfer their work in a manner that bypasses traditional gatekeepers. These de- velopments promise profound implications not only for how assets are managed but also for how communities are formed and value is gener- ated in the digital space.

Despite their growing prominence, both DeFi and NFTs are still in relatively nascent stages, and their full impact on the digital economy is yet to be understood. Academic research in these areas still needs to be more comprehensive, with many topics still needing to be explored, such as the valuation dynamics of NFTs, the ecosystems that form around decentralized assets, and the interplay between digital and physical ownership models. To address these gaps, this Special Issue brings together six articles that explore various dimensions of NFTs and DeFi, providing a mixture of theoretical and empirical insights into these complex ecosystems. The articles in this collection analyze issues such as consumer perception and value creation in the NFT market, the emer- gence of new business models that bridge the gap between physical and digital assets, and the role of risk management in the context of emerging digital assets like DeFi and NFTs. They also examine the network dynamics of decentralized finance systems, the economic im- plications of virtual real estate within blockchain-based metaverses, and the diverse motivations behind NFT ownership. Together, these contri- butions aim to deepen our understanding of how blockchain technology is reshaping not only financial and economic systems but also cultural and social dynamics in the digital age.

This editorial synthesizes the insights provided by the six articles, highlighting their theoretical contributions and practical implications for both academics and industry stakeholders. By presenting a broad overview of current research, we hope to foster continued exploration and discussion on the transformative potential of blockchain-based technologies in finance, ownership, and community engagement.

2. Overview of articles in the special issue

This section introduces each of the six articles in the Special Issue, summarizing their key themes, findings, and contributions to a broader understanding of DeFi and NFTs.

2.1. Network analysis in DeFi transactions

In the article "Unraveling the Crypto Market: A Journey into Decen- tralized Finance Transaction Network", Alamsyah and Muhammad (2024) employ network analysis to dissect the intricate relationships that define the DeFi market, focusing specifically on transaction data involving DAI, UNI, and WBTC tokens. By analyzing over 5.8 million transaction re- cords spanning from January 2022 to January 2023, the authors reveal the structural characteristics of the DeFi ecosystem, including network size, transaction density, and the presence of distinct clusters of activity. The study employs centrality metrics to determine which wallet ad- dresses are most influential within the DeFi network, providing insights into the distribution of power and influence across participants. The authors also assess the quality of community formation within the DeFi space using modularity metrics, which indicate the degree of cohesive- ness among different groups. These findings suggest that DeFi ecosys- tems are characterized by both dense clusters of activity and prominent individual actors, reflecting a complex interplay between decentraliza- tion and concentration of influence.

The paper enhances our understanding of the dynamics within the DeFi ecosystem by providing a comprehensive analysis of transaction networks. The use of network analysis methods to uncover market structures and identify key actors offers valuable insights for developers, regulators, and investors. The findings can help inform strategies to optimize DeFi platforms for improved efficiency and security, making the sector more robust and accessible.

2.2. Consumer value in NFT markets

In the article "A Nascent Market for Digital Assets: Exploration of Consumer Value of NFTs", Zalan and Toufaily (2024) explore how con- sumers derive value from NFTs, providing an in-depth analysis of the underlying motivations that drive individuals to create, trade, or collect non-fungible digital assets. Through interviews with 38 participants, the authors reveal that NFTs offer multiple dimensions of value that include speculative, utilitarian, emotional, and social aspects. The authors note that the speculative element is particularly pronounced, with many participants likening their involvement in the NFT market to day trading or speculation on other financial instruments. The study also focuses on community dynamics surrounding NFTs, emphasizing the importance of online communities in value co-creation. These communities often serve as a primary source of information, helping participants navigate the complexity of projects and make more informed decisions. The study extends research on consumer

value to incorporate new, blockchain- specific factors, such as digital provenance and scarcity.

The study makes a theoretical contribution to the literature on crypto-marketing and consumer behavior by advancing a novel model of NFT consumer value. It highlights that NFTs should not be perceived merely as unique digital assets but as part of a larger speculative culture that integrates financial behavior with community participation. Prac- tically, the insights can assist brand managers and creators in formu- lating strategies that leverage community engagement and speculative appeal to drive adoption and market growth.

2.3. Motivational heterogeneity in NFT ownership

Ante's (2024) study, "The Polychotomy of NFT Ownership: Motivational Heterogeneity and Underlying Drivers", provides an in-depth exploration of the diverse motivations behind NFT ownership. Using survey data from 343 NFT owners, the study categorizes participants into four distinct motivational groups: (1) Utilizers, (2) Socializers, (3) Specula- tors, and (4) Aesthetes. Utilizers focus on the practical uses of NFTs, such as accessing specific services or functionalities. Socializers are driven by community and networking opportunities that NFTs offer, particularly through their involvement in social platforms and exclusive groups. Speculators are motivated by the potential for financial gain, viewing NFTs as an investment opportunity, while Aesthetes value NFTs for their artistic and cultural significance. The article further examines how in- dividual traits such as risk tolerance, impulsivity, and prior investment experience influence group membership. The identified motivational heterogeneity suggests that NFT owners are far from a monolithic group and that understanding these motivations is essential for creating tar- geted marketing strategies and engagement initiatives.

The paper enriches the discourse on NFT ownership by presenting a nuanced view of the different types of motivations that drive users. By categorizing NFT owners based on their primary motivations, Ante (2024) provides insights that can help NFT platforms, creators, and marketers tailor their offerings to meet the specific needs of different segments within the NFT market. This segmentation is crucial for effective targeting, as each group responds differently to market op- portunities and promotional activities.

2.4.   NFT business models in fine arts

The article "A New Business Model in the Fine Arts Realm Based on NFT Certificates and Pearl Codes"

by Kuehn (2024) introduces a novel business model that leverages NFTs to create a permanent link between a physical artwork and its digital representation, referred to as its digital twin. In the current landscape, NFTs are often limited to representing digital versions of art without establishing a secure and lasting connection to the physical item. The model proposed in this paper addresses this gap by utilizing blockchain technology to ensure that the digital twin and its corresponding physical artifact are interconnected in a tamper-proof manner. This linkage provides several key benefits, including the pre- vention of fraud and the enhancement of transparency in the fine arts market. The NFT serves as a certificate of authenticity, a communication token, and a traceable record of ownership, thereby enabling stake- holders to verify the legitimacy of both digital and physical art pieces. Additionally, the model is underpinned by a formal specification, which ensures its correctness and utility in a wide range of scenarios, partic- ularly in resale and inheritance contexts. As a proof-of-concept, the model was implemented in a real-world scenario based on a leading NFT marketplace, demonstrating its practical feasibility.

Kuehn's (2024) model offers a framework that could reshape how authenticity, ownership, and value are managed in the fine arts sector. By securely linking physical and digital assets, the article provides a solution to some of the pressing challenges faced by collectors and art- ists, such as the risks of fraud and difficulties in authenticating valuable works (Guadamuz, 2021; Horky, Rachel, & Fidrmuc, 2022; Wilson et al., 2021). The proposed approach opens up new opportunities for sus- tainable revenue models where artists and collectors can benefit from the digital economy without compromising on the authenticity of their physical assets.

2.5.   Valuation of virtual land in the metaverse

Casale-Brunet, Mattavelli, and Chiariglione's (2023) article „Exploring Blockchain-Based Metaverses: Data Collection and Valuation of Virtual Lands Using Machine Learning Techniques"focuses on the valuation of virtual land within blockchain-based metaverses, such as Decentral- and and The Sandbox. With the increasing popularity of metaverse platforms, understanding the factors that drive the value of virtual real estate has become crucial. The authors develop a metaverse analysis tool that uses machine learning techniques to collect and analyze data from blockchain transactions, platform-specific metadata, and social media trends. The study demonstrates that the value of virtual land parcels is significantly influenced by their location within the

virtual world, similar to the factors that drive the valuation of physical real estate. Furthermore, the authors illustrate how data from social media and user engagement can be integrated into valuation models, providing a comprehensive view of market trends and user behavior. The use-case scenario focused on digital parcel trading highlights the importance of network effects and user activity in shaping value within the metaverse. This paper provides a novel approach to understanding virtual asset valuation by integrating blockchain data with machine learning and social media analytics. The findings underscore the similarities between virtual and physical real estate while highlighting the unique factors that influence digital land value in the metaverse. The study has implications for investors, developers, and policymakers interested in the market for digital real estate (e.g., Ante, Wazinski, & Saggu, 2023; Dowling, 2021), particularly as it relates to value creation and asset management within virtual environments.

2.6. Gold-backed cryptocurrencies as hedges for NFTs and DeFi

The study „Can Gold-Backed Cryptocurrencies Have Dynamic Hedging and Safe-Haven Abilities Against DeFi and NFT Assets?" by Belguith, Manzli, Bejaoui, and Jeribi (2024) examines the potential of gold-backed cryptocurrencies to act as a hedge and a safe haven against the volatility of NFTs and DeFi assets, particularly during times of market stress. The authors employ a time-varying Student's copula approach to analyze the dynamic correlations between gold-backed crypto-currencies—such as PAXG, PMGT, and DGX—and a range of DeFi tokens and NFTs. The analysis covers the period from late 2021 to early 2023, a timeframe marked by significant market turbulence, including the 2022 crypto bear market. The findings suggest that gold-backed crypto-currencies, particularly PAXG and PMGT, demonstrate robust hedging capabilities during periods of normal market conditions while also acting as effective safe havens during market downturns. This dynamic behavior implies that investors can strategically employ these assets to mitigate risk in portfolios heavily weighted in DeFi and NFTs. The study also reveals that the dependence between these assets varies over time, suggesting that portfolio diversification strategies should be adaptive to changing market conditions.

The findings provide insights for portfolio managers and investors seeking to diversify their holdings in the digital asset market (e.g., Hackethal, Hanspal, Lammer, & Rink, 2022; Petukhina, Trimborn, Ha¨rdle, & Elendner, 2021). By demonstrating that gold-backed crypto- currencies can serve as effective

risk management tools, the study bridges the gap between traditional and digital assets, offering practical guidance for constructing more resilient portfolios. The findings un- derscore the importance of diversification and highlight the potential of gold-backed cryptocurrencies to enhance the stability of investments in a highly volatile sector.

3. Theoretical contributions

The collective contributions of the articles in this Special Issue converge around a central theme: the reconfiguration of economic value, ownership, and financial systems enabled by blockchain tech- nology. By examining the interplay between DeFi, NFTs, and their broader implications, the studies provide an integrated understanding of how digital technologies are transforming the economic landscape in fundamental ways.

One of the key theoretical insights that emerge is the shift in the locus of value creation and concentration. Traditionally, value was predominantly shaped by centralized entities, such as banks, art galleries, or institutions that served as intermediaries validating and facilitating transactions. The articles demonstrate how blockchain technology dis- places this centralization, instead fostering a more distributed model where value is co-created, managed, and transferred by networks of individuals and communities (Ante, 2024; Zalan & Toufaily, 2024). This phenomenon is especially evident in NFTs, where value is no longer just inherent in the asset itself but also derived from the social interactions and communal experiences that surround it. Community engagement, whether through digital platforms or social networks, becomes a crucial determinant of an asset's worth, reflecting a shift from hierarchical, institution-driven value to peer-based, participatory value systems.

Closely tied to this is the transformation of ownership. Blockchain enables novel forms of asset representation—digital certificates or dig- ital twins— which provide verifiable authenticity and provenance without the need for centralized authorities (Kuehn, 2024). This changes how ownership is understood and managed across various domains, from digital art to virtual real estate. Technological advancements enable creators and owners to retain greater control over their assets, leading to a more democratized and transparent form of ownership. The resulting disintermediation is not merely about removing middlemen but also about empowering individuals to engage directly in the eco- nomic value chain, thereby altering traditional power dynamics and potentially creating more equitable access to value-creation opportunities.

Another major insight is the role of risk management

in this decen- tralized landscape. While blockchain promises transparency and democratization, the volatility and complexity of DeFi and NFT markets introduce new forms of financial risk. The integration of more tradi- tional assets, such as gold-backed cryptocurrencies, into digital asset portfolios is an attempt to stabilize this otherwise unpredictable envi- ronment (Belguith et al., 2024). This hybrid approach illustrates how the traditional and digital financial worlds are converging, leveraging the stability of conventional assets to mitigate the risks associated with highly speculative digital innovations. This blend of old and new financial mechanisms highlights the necessity for adaptive risk man- agement strategies in a rapidly evolving economic context, where traditional methods of financial security must evolve to address the complexities introduced by decentralization.

The studies also bring to light the nuanced nature of decentralization itself. Although blockchain is celebrated for its potential to decentralize power and provide distributed access, the network analysis of DeFi ecosystems reveals that certain nodes or actors can gain outsized influ- ence (Alamsyah & Muhammad, 2024). This suggests that decentralized systems are not immune to concentration of influence when centrali- zation emerges organically. Recognizing this duality is crucial for the development of fair governance structures in blockchain-based ecosys- tems, where ensuring equitable participation remains a core challenge. It implies that decentralization is not an absolute state but rather a continuum shaped by the behaviors and interactions of participants within the network.

Lastly, these studies collectively reflect a broader rethinking of how assets—whether physical, digital, or entirely virtual—are valued in the modern economy. Traditional valuation models, which are based on scarcity, location, and intrinsic value, are being reimagined to account for new types of assets whose value is often contingent on network ef- fects, digital utility, and social sentiment (Casale-Brunet et al., 2023). Virtual real estate, for example, is valued not only based on its scarcity but also on factors such as user engagement and platform dynamics, indicating that the principles of value determination are evolving in tandem with technology. This shift necessitates new theoretical frame- works that can accommodate the unique characteristics of digital and hybrid assets in an increasingly interconnected economic landscape.

In essence, the contributions in this Special Issue collectively illustrate a profound transformation in economic theory and practice. DeFI and NFTs allow value to become more participatory, ownership more transparent and democratized, risk management more integra- tive—all while decentralization is more complex than initially perceived. These insights not only deepen our understanding of the current digital economy but also provide a framework for anticipating how blockchain technologies will continue to redefine economic re- lationships and opportunities in the future. The integrated perspective presented by the studies of this Special Issue thus serves as a foundation for exploring the ongoing evolution of decentralized and community- driven digital systems, where traditional economic paradigms are increasingly being reshaped by technological innovation.

4. Conclusion

The studies in this Special Issue provide an integrated understanding of how blockchain technologies, particularly DeFi and NFTs, are reshaping the foundations of economic systems. By decentralizing value creation, transforming ownership models, integrating novel risk man- agement strategies, and revealing the nuanced dynamics of decentral- ization, these contributions collectively illustrate the potential of blockchain to disrupt traditional economic paradigms. The trans- formation is marked by a shift towards more participatory and trans- parent systems, greater empowerment of individual stakeholders, and a convergence between the stability of traditional assets and the in- novations of digital finance. These insights provide a foundation for understanding the ongoing evolution of decentralized digital systems and their impact on value, ownership, and economic interactions.

Future research may focus on addressing the challenges that emerge as decentralization evolves, especially concerning governance and the unintended centralization of influence within supposedly flat networks. It is also crucial to explore how regulatory frameworks can be crafted to balance innovation and fairness in decentralized ecosystems, ensuring security while supporting equitable participation. Additionally, the cultural and social impacts of NFTs and DeFi on existing industries as well as the development of sophisticated valuation models for digital and hybrid assets, present valuable avenues for further investigation. These future explorations will be instrumental in fully understanding the transformative potential of blockchain technology in reshaping the economy of the digital age.

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