Blockchain Digital Innovation: A Bibliometric Analysis

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Abstract

There is still an innovation research deficit on the management aspects of blockchain digital innovation products; consequently, we consider the present research a promising and relevant one for

both academics and practitioners. The study aims to review the current available literature in Wos Web of Science platform on the topic of blockchain digital innovation. The output is a bibliometric analysis meant to unfold the evolution of the research on blockchain digital innovation, also focusing on understanding the main research clusters on the topic, along with the most promising co-authorship occurrences. The results reveal eight research clusters, the biggest one having the concept of blockchain as the dominant one, followed closely by innovation and the one on bitcoin. In this paper, we analyse current patterns based on the literature and provide recommendations for future studies.

Keywords: *blockchain, innovation, blockchain digital innovation, literature review*

JEL classification: O32, O31

DOI: 10.24818/RMCI.2024.2.189

1. Introduction

The motivation of this study is rooted in a fact that, as mentioned in a recent special issue in Technovation, despite research on how the possibilities offered by digital innovation may unfold (Nambisan *et al.*, 2017; Allen, 2020) there is still an innovation research deficit on the management aspects of blockchain consequence (Stelvia *et al.*, 2022). Blockchain is neither good nor bad (Kewell, Adams and Parry, 2017), but its consequences are strongly linked to contextual and temporal factors. Blockchain technology attracts significant interest as it facilitates among

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other benefits lowering the cost of institutional entrepreneurship, propelling a process of institutional evolution (Allen, 2020). Context is of a very high relevance for blockchain products innovation research because differences in geography, values, norms, and cultural factors influence designing, assessing, implementing, and interpreting research (Stelvia *et al.*, 2022) which are fundamental in the management debate.

On the contrary to Choi *et al.*, (2023) addressing platform blockchain innovation, our research targets blockchain product innovation approaches in and adds to the body of knowledge useful insights for both academics and practitioners by looking at the drivers, tactics, difficulties, and results of blockchain-based product innovation in SMEs, relying of the current state of knowledge. This research examines the approaches and models that blockchain entrepreneurs put forward to leverage blockchain technologies to develop new systems of governance for economic exchanges in different contexts. We intend to examine characteristics of these approaches and models, the challenges faced by the entrepreneurs, the impact that these models have in the marketspace, as well as how such models, challenges and consequences evolved over time. The aim is to build an understanding based on the available literature of how time and context influence the characteristics and consequences of new models of blockchain applications.

2. The concept of blockchain

Invented in 2008 blockchains bitcoins were first conceptualized in the same year by Satoshi Nakamoto, who used a Hashcash-like method for timestamping blocks, which were not required to be signed by a trusted party (Ullah and Al-Turjman, 2023). Blockchain technology (and other distributed ledger technologies that do not arrange data in blocks) is an internet-based digital protocol to operationalize a decentralized economy (Allen, 2020), providing a digital platform for decentralized digital there a wide spectrum of applications ranging from cryptocurrency, financial services, risk management, internet of things to public and social services (Zheng *et al.*, 2018). Blockchain as one of the main drivers of digital transformation in companies (Akter *et al.*, 2022) and a "trust machine" (Poblet *et al.*, 2020) is a broad concept that encompasses a model for bit coin transactions, highly resilient against tampering of the data (Arjun and Suprabha, 2020).

Based on its advantages as an open, distributed ledger that can record transactions between two parties efficiently and in verifiable and permanent manner (Iansiti and Lakhani, 2017), blockchain technology has had many applications in business in recent years, due to reducing the cost of transactions and to the potential of reshaping the economy. In this research, we state the current scientific context of product innovation blockchain digital innovation approaches post the motivation of our research, the elements of novelty and research gap we cover based on the available literature.

The development of blockchain technology, along with other digital technologies (Industry 4.0, Internet of Things, cloud computing, big data) is

positively affecting companies (Ancillai *et al.*, 2023) and has created numerous opportunities for innovation across numerous industries through value creation, value delivery as the development of new technologies has created new opportunities for entrepreneurs (Cîmpan *et al.*, 2022). In the academic literature so far 83% of published blockchain articles are entirely conceptual, and only 17% are empirical (Frizzo-Barker *et al.*, 2020). Even though blockchain technologies provide entrepreneurial firms with significant opportunities (Myrzashova *et al.*, 2023; Ye *et al.*, 2023), as it a shift from trusting people to trusting math (Nofer *et al.*, 2017), there is still limited extent research on this topic mostly because of its novelty (Morkunas, Paschen and Boon, 2019; Ahluwalia, Mahto and Guerrero, 2020).

3. Research methodology

In this research, we opted for a literature review method stating from the recommendations of Tranfield, Denyer and Smart, (2003) Denyer and Tranfield, (2009), and Crisan (2022) with the purpose of identifying trends in blockchain product innovation reported in the literature. In the identification and screening stage, we performed a review of existing articles concerning our central topic by first searching in August 2023 in the Wos Web of Science database for the term: "blockchain digital innovation". In the extracting phase, we reached a number of 1153 valid results, after applying inclusion and exclusion criteria to our search. For further analysis, we employed VOS viewer software.

4. Results and interpretation

Even if academic research on blockchain technology is still considered in its infancy (Zulfikri, Kassim and Othman, 2023), a comprehensive and recent bibliometric analysis performed by Yang *et al.*, (2022) shows that blockchain research evolved so far in three stages. During 2017 to 2018 research was focused on bitcoin as the main vehicle for fame, during the 2018 to 2019 blockchain economy was in focus, and between 2019 to 2020 the topic on blockchain innovation emerged. According to Wan, Gao and Hu, (2022), blockchain innovation is currently on a growing trend. Due to the need of an even fresher picture of blockchain research, we conducted a brief bibliometric analysis in the VOS viewer software. After running the data in Vow viewer we obtained the co-occurrence output showing 8 main clusters of keywords, the most prominent being the green one surrounding the concept of blockchain (smart contracts, internet of things), followed closely by the red one on innovation (digital transformation, adoption , and management), and blue one on bitcoin (see Figure 1).

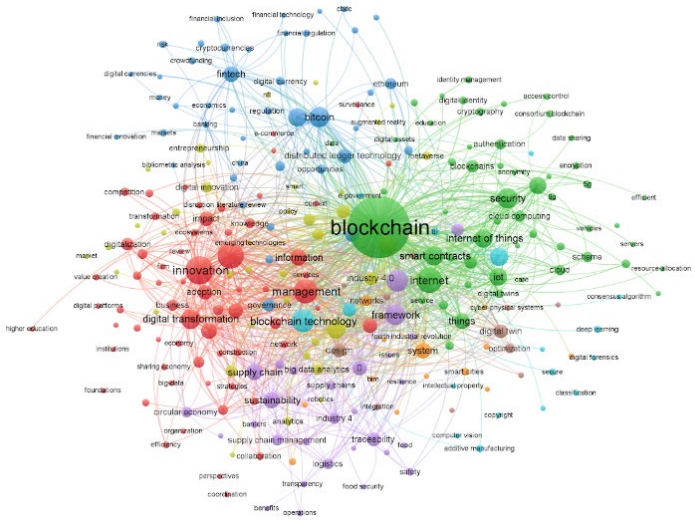

Figure 1. Blockchain digital innovation clusters. Source: VOS viewer output

Time evolution of blockchain digital innovation research is marked in Figure 2, showing how blockchain research peeked around the year 2020 and gradually evolved towards topics such as innovation and digital transformation in 2021, and towards cloud computing, internet 4.0 and circular economy in 2022. The co-authorship analysis (Figure 3) reveals 18 main clusters of researchers around the word with Zhang Y being the biggest cluster.

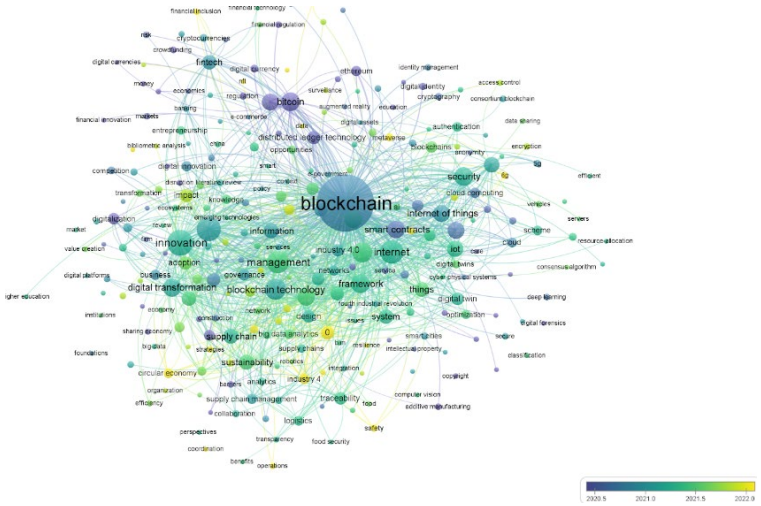

Figure 2. Time evolution of publications on blockchain digital innovation
Source: VOS viewer output

By gaining insight into these practices, firms can effectively harness blockchain to drive creativity and gain a competitive advantage in any industry. Start-ups are renowned for their nimbleness and capacity to embrace emerging technologies, for their boldness and capacity to challenge paradigms. The decentralized and characteristics embedded within blockchain have the capacity to radically transform the process of creating and delivering products which deliver higher value to the customers in new and unexpected manners. Based on the available research and our analysis, we list more gaps and aspects related to blockchain digital innovation.

Understanding the Blockchain Landscape: according to the literature, it is crucial for entrepreneurial firms to possess a comprehensive understanding of the blockchain landscape. With state-of-the-art technology, the private sector has pushed outside the boundaries set in place by the old system (Ion, Zamfir and Mocanu, 2022). IT professions also see an abundance of new types of jobs from big data engineers, cold computing blockchain that are already being established (Moldoveanu, 2022). This entails fully grasping the foundational technology, its potential applications, as well as its strengths and weaknesses. By acquiring such knowledge, firms can effectively identify suitable scenarios where integrating blockchain would be advantageous and develop ground-breaking innovative products (Wan, Gao and Hu, 2022). As mentioned by Tapscott and Euchner, (2019), it is crucial for entrepreneurial SMEs to have a profound understanding of the blockchain landscape, encompassing its fundamental technology, possible applications, and advantages and limitations. This level of knowledge empowers firms to identify appropriate use cases for integrating blockchain and generate inventive products. Surprisingly, a wide majority of published blockchain articles are conceptual (Frizzo-Barker *et al.*, 2020), underlying yet again the novelty of the field.

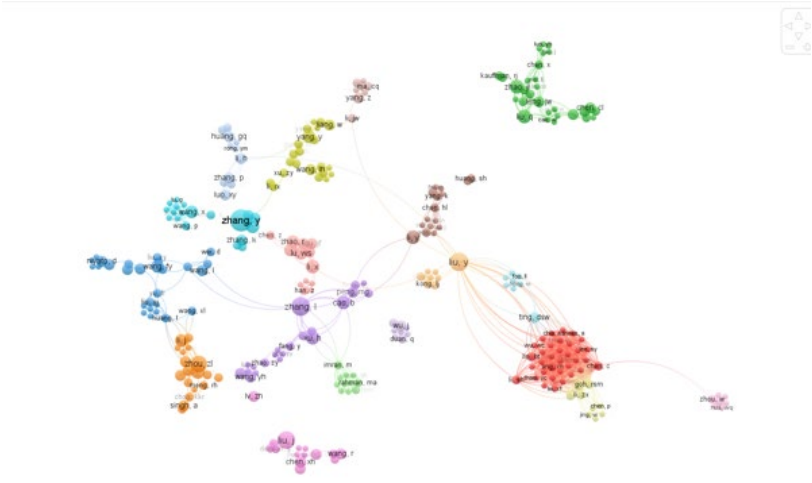

Figure 3. Co-autorship clusters. Source: VOS viewer output

Collaboration and Building an Ecosystem: collaborating with various stakeholders within the blockchain ecosystem has proven beneficial for entrepreneurial firms. Papadonikolaki *et al.*, (2023) states that SMEs stand to gain more from blockchain innovation ecosystems as they will be more protected against visibility across their supply chains. According to research conducted by Iansiti and Lakhani, (2017) entrepreneurial SMEs can reap benefits from collaborating with various stakeholders within the blockchain ecosystem. Established partnerships with technology providers, industry leaders, and regulatory bodies strengthen the adoption and execution of products based on blockchain technology. Such collaborative approaches nurture innovation while equipping firms with essential resources and expertise they require in their journey.

User-Centric Design: prioritizing the needs, preferences, and usability of users is crucial in successfully developing blockchain products. According to Kosba *et al.*, (2016) it is essential for firms to consider user-centric design principles when creating blockchain applications to generate intuitive and captivating experiences that promote both adoption and customer satisfaction.

Regulatory and Legal Considerations: the intricacies of regulations pose a significant obstacle in implementing blockchain technology. As highlighted by Werbach (2018) blockchain establishes trust on the foundation of mutual distrust, hence it is vital for individuals involved in introducing blockchain-based digital innovations to comprehend and address legal frameworks, privacy concerns, and compliance requirements appropriately. Taking proactive measures becomes imperative to guarantee seamless integration while mitigating potential risks.

Scalability and Interoperability: achieving scalable solutions and fostering interoperability are key challenges that need consideration when embracing blockchain technology. Researchers like Christidis and Devetsikiotis, (2016) emphasize the need for entrepreneurial firms to explore solutions that address the limitations of current blockchain systems, such as high transaction costs and slow processing times. Developing scalable architectures and interoperable protocols enhances the efficiency and integration of blockchain products. As mentioned by Dwivedi *et al.*, (2023) another significant gap we cover is the consideration of blockchain innovation complexity by focusing on the drivers of technological change.

5. Conclusions

From the economic perspective, our study contributes to the body of knowledge available to blockchain entrepreneurs across the world, who will be able to use the results of our research to foster innovation in their products based on blockchain technology as this enhances collaborative innovation (Wan, Gao and Hu, 2022). Paradoxically, data showed that technological change and innovation are limited by the traditional business models in the industry that do not allow for knowledge spill over effects in both open and closed innovation scenarios (Papadonikolaki *et al.*, 2023) consequently we believe that by more in depth

research in blockchain digital innovation products will shed more light into the topic.

The research provides valuable results, which could influence a very important sector. Blockchain products are important disruptors due to their innovative complexity, regardless of the economic sector, ranging from agri-food sector (Calafat-Marzal *et al.*, 2023), platform supply chains (Choi *et al.*, 2023), seafood companies (Thompson and Rust, 2023), auditing (Elommal and Manita, 2021), or public sector (Kassen, 2022). The elements of originality and novelty that the proposed project brings to the domain is derived from the topic itself. Blockchain, as the latest disruptive technology (Frizzo-Barker *et al.*, 2020) presents companies with unprecedented opportunities for product innovation and disruption (Thompson and Rust, 2023). This literature review has highlighted the importance of understanding the blockchain landscape, fostering collaboration, adopting user-centric design principles, addressing regulatory challenges, and ensuring scalability and interoperability. We strategically contribute to blockchain digital innovation literature benefiting entrepreneurs to gain competitive advantage, and academics alike.

Acknowledgements

IBL, Project co-financed by FEDR through Competitiveness Operational Programme 2014 – 2020, MySMIS code: 129898, Funding contract: 55/221_ap2/09.07.2020

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