

Creative Economy in the Digital Age. Blockchain and Copyright Through an Industry Lens

Ana-Maria OSADCI-BACIU

National University of Political Studies and Public Administration

30A Expoziției Blvd, District 1, Bucharest, Romania

ORCID No. 0009-0006-2561-4238; ana-maria.osadci-baciu@facultateademanagement.ro

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Abstract

As technology evolves and most of the existing industries have a digital presence, with digital assets, traditional copyright protection methods tend to become obsolete. Cultural and creative industries (CCIs) are particularly vulnerable to copyright infringement. Blockchain is promising in this regard due to its ability to provide decentralized solutions for rights management, authorization, and maintenance. This study employs a bibliometric analysis to map industries actively researching blockchain solutions for copyright and to identify CCIs' place within them. It also seeks to observe comparative patterns between the identified CCIs' research trajectories. Results show that CCIs account for more than one-third of the overall research, with Media & Entertainment leading in absolute numbers and NFT & digital assets leading in growth rate. An interesting finding worth paying attention to is a deceleration tendency in pioneering industries, contrasting with more intense research in those that started later. Altogether, it seems that research does not always follow the most endangered industries; what fuels it is a combination of market dynamics, technological novelty, and immediate need. The implications may prove useful for both researchers analyzing blockchain adoption patterns (especially if their focus is on CCIs) and practitioners deciding whether to deploy such solutions.

Keywords

Blockchain; Creative Industries; Bibliometric Analysis; Digital Transformation; Copyright Protection; Cultural Industries; Innovation.

Introduction

Following the onset of the digital revolution and its continuously arriving waves, business models changed, too. In the realm of CCIs, the way creative works are produced, distributed, shared, and monetized nowadays has changed significantly from how these processes used to work several decades ago, making established copyright protection mechanisms vulnerable. In this industry, intellectual property is at the core, so its security is critical to the business. In manufacturing and industrial processes, the physical-first nature of their assets offers intrinsic protection that is further reinforced by patent laws. At the same time, creative outputs are easily transferable and replicable in the digital sphere. Piracy protection and effective copyright enforcement are therefore quite complex in the context of CCIs (Mogol & Crudu, 2022; Savelyev, 2018). The emergence of streaming platforms, social media distribution, generative AI, and other such technological developments adds new layers with loopholes for unauthorized distribution, further complicating the picture.

Since the emergence of Blockchain 2.0, it has been discussed as a prospective resolution for copyright protection, due to its advanced capabilities for rights management, ownership tracing through immutable records, and automated royalty payments through smart contracts, among others, meaning an ability to create environments where little to no intermediaries would be required to confirm ownership, authorize use, etc (Bodó et al., 2018). However, to date, it has been more explored at the conceptual level or in small-scale experiments rather than widely deployed in the market. Its implementation is constrained by scalability limitations due to high energy consumption (meaning higher costs and sustainability issues), regulatory ambiguity, and CCIs' specific aspects, such as complex stakeholder structures, financial challenges, and a lower degree of technical skills among the involved actors (Malik et al., 2023; Tresise et al., 2018).

Although there is a consistent body of research around blockchain's applications for copyright, including for CCIs, the existing studies are either more focused on specific industries, such as music (Ciriello et al., 2023), digital art (Helman & Tur-Sinai, 2024), or media content distribution (Aldweesh, 2024), or when they are mapping the broad picture through bibliometric analysis, they tend to centre on broader aspects, such as technological or legal (García et al., 2025). This paper aims to offer a new perspective by analyzing research patterns through an industry double lens: mapping how studies on CCIs position within the broader industry landscape and comparing the identified CCIs against one another.

Literature review

Blockchain for copyright protection - could it be a match?

Most of the copyright mechanisms in place have been designed for an era when the physical aspect of the business was still first (Peukert & Windisch, 2025). Nowadays, when businesses have an entire digital persona and libraries of assets in the electronic realm, the traditional copyright system and tools struggle to keep pace with the speed of online content generation and reproduction. Blockchain-based solutions address three key related challenges: verification of rights ownership, authorization of use, and ongoing maintenance of rights records, often enforced through smart contract architecture (Bodó et al., 2018; Savelyev, 2018). This happens in the context of a paradigm shift across industries from centralized, institution-dependent models towards decentralized, algorithmically enforced ones (Xie & Tang, 2024). The implications are beyond technological aspects, extending into the organizational level, particularly towards two directions with potential for transformation: business models and governance practices. Depending on the business, the copyright protection aspect could fall in either of the two categories, but rarely outside them. Besides all these transformations, however, there is an underlying tension between technological possibilities and real organizational readiness.

Regarding blockchain specifically, some researchers see it as a truly transformative force that could entirely restructure the copyright system (Guo et al., 2020; Nizamuddin et al., 2019). It implies a core change by creating direct business-to-consumer or even creator-to-consumer channels and eliminating intermediaries, thereby ensuring automation, accuracy, and splitting the savings between the supply and demand sides. The general view is more cautious, though, considering blockchain as a complementary infrastructure that could address certain challenges, such as timestamping or provenance tracking, while maintaining and organically adjusting existing legal frameworks rather than displacing them (Bodó et al., 2018; Savelyev, 2018). Tresise et al. (2018) argue that blockchain is too fallible to serve as a sole protection technology, demonstrating that it can indeed provide proof of existence. However, when it comes to determining whether content is truly original, it often fails on its own because it lacks an intrinsic mechanism to establish originality, and the first instance of a work online is not enough proof in itself. This aspect is especially important but often overlooked by more optimistic points of view.

CCIs' copyright protection challenges and why they matter

Finding advanced solutions for copyright protection in the context of CCIs is an economic necessity due to the financial losses these industries face as a consequence of infringement issues, a threat to their core assets, which are generally content-related. This happens across CCIs. For example, in the music industry, an estimated 20% to 50% of royalties never reach their rightful owners, remaining lost in the opaque and complex systems used for licensing and distribution (Rethink Music, 2015). Platformization and streaming business models, while streamlining monetization, add layers of complexity that increase the challenge of copyright tracking (Chalaby, 2024; Mazziotti & Ranaivoson, 2024). In publishing, likewise, to a high degree, although less documented, rights tracing across digital formats and territories, as well as accurate and traceable royalty distribution, are misty realms (Ryan et al., 2023). In the case of visual arts, unauthorized online reproduction is a core challenge, alongside the market valuation of digital works (Rennie et al., 2019). Even museums, which are more rooted in physical reality, face digital copyright infringement challenges for their digitized collections, needing viable provenance verification tools and protection systems for digital heritage (Rubino, 2023).

The copyright challenge of CCIs is rather structural. It is closely related to how these industries are organized around multiple stakeholders and intermediaries, each with distinct business practices, database structures, and incentive systems (Ciriello et al., 2023). Mitigating this threat, however, could prove particularly beneficial for their entire economic ecosystem, as it would not only help address the monetization issue but also unlock potential digital business models these institutions could not consider before due to piracy concerns. CCIs' wellbeing matters from both economic and social perspectives, as they represent over 3% of total global GDP (UNCTAD, 2024) and, at the same time, serve as vehicles for cultural expression, identity building, and social cohesion (Cominelli & Greffe, 2012). An increase in CCI research has been noted, as it has been found to be an important driver of sustainable growth (Komorowski & Lewis, 2023). Alleviating the copyright issue for this sector could have non-linear positive effects on society.

Change management difficulties

With all the theoretical promise of blockchain, there is an undeniable gap when it comes to practical implementation. The question is where it resides. One part of the answer lies in the very architecture of this technology. Per its current infrastructure, due to data size constraints, blockchain cannot actually store digital assets. Instead, it relies on external storage systems with hash-based verification (Aldweesh, 2024; Tresise et al., 2018). This arrangement, while effective, has vulnerabilities related to data integrity and permanence, so it falls short of theoretical efficiency. Another concern relates to this technology's high energy consumption, especially in the context of consensus mechanisms and NFT transactions, which is problematic from an environmental perspective and from a cost perspective (Apostu et al., 2022). Advancements such as proof-of-stake architectures come to mitigate this issue, but they do not solve it entirely. There are multiple intricacies from a legal standpoint, too. One such example is party identification. Blockchain can only identify by cryptographic addresses, whereas, in general, law requires a more specific party description, including full personal details (Bodó et al., 2018; Sung, 2019). This is an illustrative example of the technological capability-versus-regulatory requirements challenge.

Even if solutions to all the aforementioned problems were found, specific change management challenges would still remain and differ depending on stakeholder type (O'Dair, 2019). For individual creators, adapting to blockchain tools means navigating unfamiliar systems with limited technical knowledge and support, keeping in mind that their entire content history is recorded, possibly changing their entire market positioning if they want to capture a wider range of benefits and features (Disemadi et al., 2023; Patrickson, 2021). For enterprises, it is truly a strategic decision, as they need to integrate the technology into their existing IP portfolios and systems, and the investment must be justifiable in terms of numbers and foreseeable ROI (O'Dair, 2019). Skills at the organizational level need to be trained to capture new technologies, including smart contract implementation, data security, and ways to troubleshoot potential problems that may arise (Bodó et al., 2018). Additionally, they need to coordinate with their partners and, sometimes, customers, and build shared data standards and governance frameworks to effectively transition to blockchain (Tresise et al., 2018). Oftentimes, these conditions are far from being met in creative industries, which contributes to this imagination-implementation gap (O'Dair, 2019; Patrickson, 2021).

Methodology

This study aims to identify and analyze the leading industries in blockchain-based research on copyright solutions, with a focus on CCIs. To achieve this, the first step was to download datasets from three distinct databases: Web of Science (WoS), Scopus, and OpenAlex (Priem et al., 2022), using “blockchain” and “copyright” as search terms. The selected databases were chosen to provide broader coverage, given the interdisciplinary nature of this study. Limitations in metadata consistency need to be acknowledged as a downside of this approach, allowing only a limited number of analysis types to be run.

The initial search yielded 440 results from Web of Science Core Collection, 762 documents from Scopus, and 1,080 records from OpenAlex. Python was used for deduplication and for generating the final file for VOSviewer processing, resulting in 1,427 unique papers in the final dataset. Python was employed for its high accuracy and control over data cleaning and preprocessing workflows. It is also more flexible than other preconfigured deduplication tools, as it provides greater visibility into the outputs of the main steps (Nowakowska, 2025).

To assign the industry label, a human-AI collaboration approach was employed. A Claude Opus 4.1 agent-style workflow was configured and trained to assign categories to each keyword (Anthropic, 2025). As input, the keyword list file, the final deduplicated dataset, and a setup that prioritizes industry spotting were provided, meaning that keywords not specifically related to an industry should be placed into broader categories. After the AI analysis output, the resulting categorization was manually checked and adjusted for the final VOSviewer analysis. This approach was taken because LLMs have higher granularity and processing speed than human coders in specific classification contexts (Törnberg, 2025). One important limitation of this categorization is that some words could be assigned to multiple categories, but, due to the research design, they were forced into the one that seemed to fit best, possibly missing more nuanced distinctions. In VOSviewer, a keyword co-occurrence map was created based on bibliographic data. The keyword industry categorization was used as a thesaurus file in VOSviewer, enabling us to see the industries rather than separate keywords. This is especially important since a simple keyword analysis would show mainly non-industry terms, such as blockchain, security-related technology terms, or legal and regulatory-related terms. VOSviewer was used for its advanced graphical representation features and its ability to map and cluster complex information (Van Eck & Waltman, 2010).

In addition to the VOSviewer analysis, Python was used again to generate metrics accompanied by graphical representations to gain a deeper understanding of several selected creative industries: Music & Audio, Creative Arts, Culture & Museums, Media & Entertainment, Publishing & Libraries, Education & Training, and NFT & Digital Assets. The aim was to find out more about research patterns in the cultural and creative industries field. Papers were assigned to industries based on the highest confidence scores, with a dual-threshold system applied to title and keywords, to ensure classification reliability, avoid false positives, and classify papers only when there was sufficient differentiation between industries, thereby reducing ambiguous assignments. The results were generated as Excel and PNG files for ease of further use and interpretation. The detailed three Python codes utilized, including their respective methods, comments, and libraries, as well as the industry categorization file, can be found at <https://github.com/anamariaosadci/blockchain-copyright-analysis> (Osadci, 2025).

Results and discussion

VOSviewer analysis: thematic structure of the research

The research domain, as shown in Figure 1, reveals a highly interconnected picture. This means that the overall research pattern has a rather interdisciplinary nature and a broader focus. From a practical perspective, this means that practices and technologies from more established industries can be translated to emerging ones, offering an opportunity for a quicker catch-up, but each industry's particularities should still be considered. Four clusters are emerging, each representing a conceptual orientation. Two of the four clusters, in particular, have their main focus specifically on CCIs, and one is transitional (it might be that the CCIs present here are exemplifying, not the main focus of the respective research). The list of keywords per cluster can be seen in Table 1.

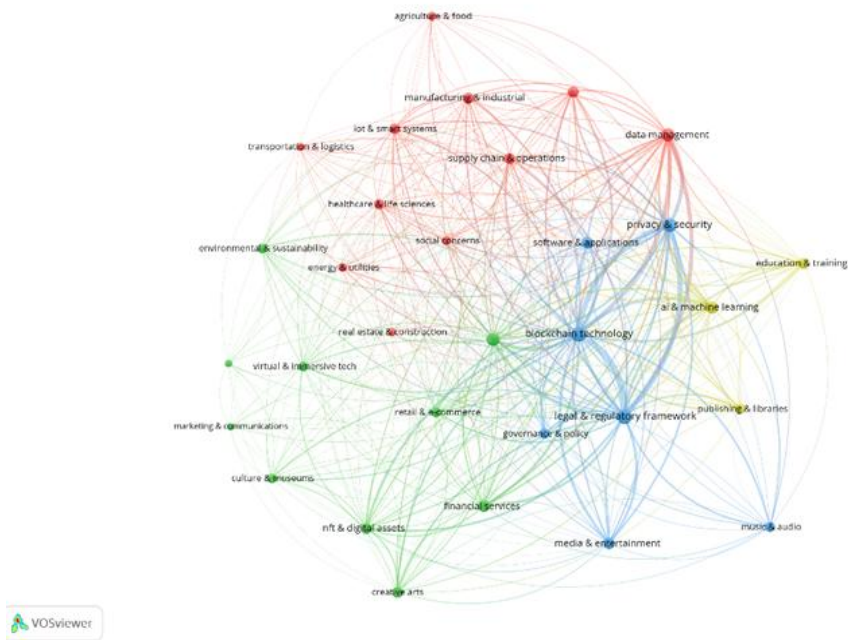


Figure 1. Keyword co-occurrence network
Source: author's research based on VOSviewer analysis

Table 1. VOSviewer thematic clusters

<i>Red: Industrial & Supply Chain</i>	<i>Green: Cultural & Creative Economics</i>	<i>Blue: Core Blockchain for CCIs</i>	<i>Yellow: Learning & Technology</i>
Agriculture & food	Creative arts	Blockchain technology	AI & machine learning
Data management	Culture & museums	Governance & policy	Education & training
Energy & utilities	Economics & business	Legal & regulatory	Publishing & libraries
Healthcare	Environmental	Media & entertainment	
IoT & smart systems	Financial services	Music & audio	
Manufacturing	Marketing	Privacy & security	
Real estate	NFT & digital assets	Software & applications	
Supply chain	Retail		
Telecommunications	Tourism		
Transportation	Virtual & immersive tech		

Source: author's research

The red cluster, which is the largest and most interconnected, focuses on industrial applications and supply chain logistics and aligns with blockchain's original use case: transaction verification. Blockchain's early adopters tended to be in more heavy-industry sectors, with greater financial power and experience with advanced technologies. There is, hence, a high probability that the same industries for which blockchain was successfully implemented for payments will also research it for copyright protection of their industrial patents, commercial secrets, or within interconnected systems (i.e., IoT). This field of research is less closely connected to the CCIs' research and appears to focus on practical applications.

The other three clusters show a more direct connection with CCIs. The green cluster focuses on CCIs. Within its context, blockchain appears to be under research as an integrated platform for commercial exchange. It can be observed that a cross-functional pattern exists, with studies around diverse CCIs

being deeply interconnected. This could mean potential for infrastructure-level application research, which could result in solutions working across cultural and creative sectors, an opportunity for innovation at the business model level. The blue cluster, on the other hand, is more focused on the technical and regulatory aspects. Looking at the keywords it includes, though, reveals connections with CCIIs such as media & entertainment, music & audio, and software & applications. As these are among the most commercially oriented CCIIs, the research focus appears to be on governance, security, and regulatory solutions to enable efficient blockchain integration and deployment. Finally, the yellow cluster, although the smallest, appears to be the most future-oriented. It links publishing, education, and AI & ML technology. This may be related to AI-generated content, which poses an acute concern for these industries; hence, they are actively researching solutions for advanced copyright protection to mitigate some of the AI-related anxieties. At the same time, this cluster could also focus on researching how AI can be integrated into blockchain solutions to enable greater flexibility, addressing a core blockchain issue.

A comparative outlook on CCIIs' research patterns

Within the blockchain copyright research landscape, papers relating to the creative industries account for about 37% of the total number of papers published (1,427), which is a significant share, more than one-third of the total research. It should be noted that, for this analysis, the data were carefully curated to avoid false positives, so the number of papers may actually be higher, but not lower, than the one presented in Table 2 and Figure 2.

Table 2. Creative industries' research patterns

Industry	No of Papers	% of CCI	Growth Rate (Post/Pre 2020)	Modal Year	First Pub.
Media & Entertainment	132	25.2%	5.95x	2023	2017
NFT & Digital Assets	111	21.2%	New field	2024	2021
Music & Audio	81	15.5%	6.36x	2024	2016
Creative Arts	63	12.0%	14.50x	2023	2017
Education & Training	55	10.5%	4.50x	2022	2018
Publishing & Libraries	54	10.3%	4.89x	2023	2016
Culture & Museums	27	5.2%	12.50x	2022	2018

Source: author's research

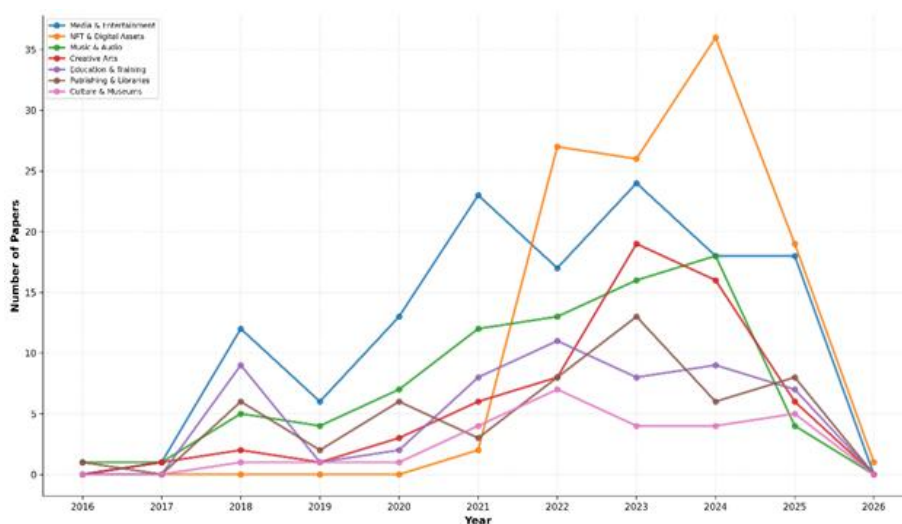


Figure 2. Temporal analysis of creative industries' research

Source: Author's research based on Python analysis

The patterns shown in Table 2 and Figure 2 reveal differences in the adoption drivers and economic circumstances across the analyzed industries. Amongst all of them, Media & Entertainment seems the only one for which the research has reached a maturity phase, powered by higher financial possibilities and more room for experimentation, as well as its particular copyright management challenges intensified by high financial stakes, new technologies impacting the market, and complex stakeholder structure (Ciriello et al., 2023). Likewise, the boom in NFT-related research is fueled by higher investment driven by speculative interest in these assets and their steep rise in popularity, combined with their intrinsic compatibility with blockchain, both of which are crypto-native (Helman & Tur-Sinai, 2024). The rapid growth of the creative arts might be linked to their pairing with NFTs in the blockchain research context, creating digital counterparts to art collectibles (Rennie et al., 2019).

Interestingly, industries that appeared to be pioneers in this research area, such as Music & Audio and Publishing & Libraries, seem to have diminished their interest in this technology over time. This might be related to structural incompatibilities and/or difficult change management for these industries (O'Dair, 2019; Patrickson, 2021). For instance, music in digital format already heavily relies on several well-established platforms that come with their own copyright protection mechanisms embedded, so adoption of a new technology depends on these platforms' strategic interests rather than the artists' or smaller music production companies' (Chalaby, 2024; Mazziotti & Ranaivoson, 2024). For Publishing & Libraries, the contrast between the early start of research on blockchain copyright protection mechanisms and the modest overall number of papers is even starker. Although at first sight it seems like a good match, it might be that this field requires more flexibility and, at the same time, global leaders in the field already have well-established and difficult-to-change processes in place, while smaller players do not have sufficient resources to experiment with blockchain technology (Ryan et al., 2023). Diving deeper into these pioneers' approaches to copyright protection and their relationship with newer technologies, such as but not limited to blockchain, would be an interesting subject for future research.

Education & Training and Culture & Museums are, along with Publishing & Libraries, industries where blockchain use for copyright protection is underexplored, with big potential for future studies, maybe even small-scale experiments. The high growth rate for Culture & Museums aligns with the virtual tours trend, which implies heritage digitization and which accelerated during the pandemic (Rubino, 2023). It might be that the public-good nature of many organizations in these fields limits commercial incentives, implying also more limited funds or funds without a continuous flow (related to time-constrained projects) and a higher level of bureaucracy. In this sense, policies to explore better copyright protection mechanisms using new technologies in these areas may be appropriate.

As a general picture, blockchain copyright research for creative industries is on an ascending path, which is indicated by the positive growth rate across all industries and the modal year being between 2022 and 2024 for each of the analyzed industries. Additionally, an interesting observation is that the earliest publications appear to be from 2016, representing a small delay from the emergence of Blockchain 2.0 (in 2014) and showing that, although not the first industries to research blockchain, CCIs were among the earliest to publish studies in the area. Future research should expand the thematic analysis to additional industries as well as to collaborative patterns between various creative industries.

Conclusions

According to this study's results, cultural and creative industries appear to be active drivers of blockchain-powered copyright protection research, revealing deep interconnectedness and accounting for a substantial portion of the overall research. Although they represent a different direction than the industrial application, cross-domain technological spillover is likely, but should be carefully approached to avoid overlooking CCIs' structural particularities. Following the same train of thought, it appears that structural change management barriers specific to CCIs underpin the deceleration trend observed in pioneering industries, such as music and, especially, publishing (O'Dair, 2019; Patrickson, 2021). It is worth paying attention to this trend and delving deeper into what lies behind this early

excitement that could not sustain momentum. Some elements, such as financial constraints, the technological skills gap, and the complex nature of the transition towards a blockchain that includes all stakeholders, are derived from the literature (Bodó et al., 2018; Tresise et al., 2018), but empirical studies are required to answer this question accurately. It is worth noting that the research intensity does not fully reflect the respective industries' degree of vulnerability. What appears to drive interest in the topic is a combination of financial and technical capabilities and an immediate need (for instance, research in culture & museums, and accelerated education driven by the need to digitize during the pandemic).

Underexplored industries, such as publishing, museums, or education, represent research gaps with potential for important breakthroughs with synergistic effects across CCIs. They also offer opportunities for policymakers seeking to enforce effective copyright protection measures, including blockchain. This is especially significant, as these industries are public-good oriented and often respond better to institutional support than to market forces alone. Limitations of this research include the inherent snapshot nature of bibliometric analyses, as rapid technological development may quickly change the entire research landscape. Additionally, due to limitations in metadata consistency, this study could run only a limited number of analyses, further constrained by the single-industry classification. Future studies should address these gaps by expanding the bibliometric analysis, conducting comparative granular studies, and delving deeper into the practical side of the research, including the path from research to implementation, practical barriers, and success stories.

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