Implementing Blockchain in Media Management Systems to Ensure Content Authenticity and Copyright Protection

I Gede Agus Krisna[1] ⓘD
[1]Universitas Hindu Negeri I Gusti Bagus Sugriwa Denpasar, Indonesia

ABSTRACT

Background. Blockchain technology has gained widespread attention recently due to its potential to improve transparency, security, and efficiency in various sectors. In the media industry, content authenticity and copyright protection issues are often significant challenges. Blockchain technology offers potential solutions to ensure the authenticity of content and protect copyrights through a decentralized and immutable system.

Purpose. This study aims to explore the implementation of blockchain technology in media management systems to ensure content authenticity and copyright protection. This research focuses on how blockchain can create a transparent and secure record of every transaction and change related to media content.

Method. This research uses a qualitative approach with a case study method. The data was collected through in-depth interviews with blockchain technology experts, media professionals, and copyright lawyers. Analysis of documents and literature was also carried out to support the findings. Thematic analysis techniques identify key themes and patterns in the collected data.

Results. The results show that implementing blockchain technology in media management systems can significantly improve content authenticity and copyright protection. Blockchain allows the creation of transparent records of ownership and changes in content, which are difficult to forge. This helps trace the content's origin and ensures that copyrights are respected and protected.

Conclusion. The research concludes that blockchain technology has great potential to address content authenticity and copyright protection challenges in the media industry. Blockchain implementation can create a more transparent and secure media management system, increasing trust between content creators, distributors, and consumers. The research recommends further development and trial of blockchain implementation in various media contexts to explore the full potential of this technology.

KEYWORDS

Blockchain, Copyright Protection, Media Management Systems

INTRODUCTION

Blockchain technology has been widely recognized for its ability to provide a transparent, secure, and immutable system (Anitha, 2024). Blockchain was initially introduced as the technology underpinning cryptocurrencies like Bitcoin, but its use has expanded to various sectors, including finance, logistics, and healthcare (Faisal, 2022). The decentralized nature of blockchain

allows all transactions and data changes to be recorded transparently and securely without needing a third party as an intermediary.

In the media industry, content authenticity and copyright protection are persistent challenges. Cases of plagiarism, content theft, and copyright infringement are common, harming content creators and media companies (Asadzadeh, 2022). Traditional technologies used to track the ownership and distribution of content are often inadequate in preventing data manipulation and copyright infringement. Therefore, more effective solutions are needed to ensure the authenticity of the content and copyright protection (Faber, 2019).

Blockchain offers a potential solution to this problem by providing an immutable record of transactions that can be verified by all parties involved. Any changes or transactions to media content can be recorded in the blockchain, creating a transparent and reliable audit trail. This allows content creators and media companies to trace the origins of content and ensure that their copyrights are protected (Feng, 2023). Previous research has shown that blockchain can increase transparency and security in supply chain management, finance, and healthcare. In the media sector, some early studies suggest that blockchain could help address content authenticity and copyright protection issues. However, blockchain application in media management is still relatively new and requires further research to explore the potential and challenges it may face (Filho, 2023).

Blockchain technology also has the potential to change the way media content is distributed and consumed. With blockchain, content creators can distribute their work directly to consumers without going through intermediaries, reducing costs and increasing profits for content creators. In addition, consumers can rest assured that the content they access is original and does not infringe copyright, which can increase consumer trust and satisfaction (Fu, 2021). The successful implementation of blockchain in media management systems requires collaboration between content creators, media companies, copyright lawyers, and technology developers. All parties must work together to develop standards and protocols that ensure blockchain is used effectively and efficiently to protect content authenticity and copyright (Desai, 2021). This research explores how blockchain can be implemented in media management systems to achieve these goals.

The effectiveness of blockchain implementation in media management systems still needs to be widely researched in depth. Although some early studies point to blockchain's potential to address content authenticity and copyright protection issues, there still needs to be empirical evidence supporting these claims (Ganai, 2024). Many technical and operational aspects of implementing blockchain in management media have yet to be explored comprehensively, such as integration with existing systems, scalability, and implementation costs (Cui, 2021). The need for clear standards and protocols for using blockchain in media management is also a significant gap (He, 2024). With agreed standards, blockchain implementation can be consistent and effective. This research aims to identify and develop the standards and protocols to ensure blockchain can be used effectively to protect content authenticity and copyright.

Another challenge yet to be widely researched is ensuring that all parties involved in the media ecosystem, including content creators, distributors, and consumers, can quickly adopt and use blockchain technology (Islam, 2024). The varying levels of understanding and technology readiness among stakeholders can be a bottleneck in successful implementation (Jaafar, 2023). This research will explore strategies to increase awareness and understanding of the benefits of blockchain in media management. The long-term impact of blockchain use on the media ecosystem needs to be better understood. The critical unanswered questions are how blockchain will affect market dynamics, the relationship between content creators and consumers, and existing business models. This research aims to fill this gap by exploring the long-term implications of blockchain

implementation in media management to provide a more comprehensive insight into the potential and challenges of this technology (Jeong, 2021).

The use of blockchain in media management systems has great potential to overcome the problem of content authenticity and copyright protection, which has been a major challenge. Blockchain can provide an immutable record of transactions that can be verified by all parties involved, thus ensuring transparency and reliability in tracing the origins and changes of media content (Jiang, 2020). This research aims to understand better how these technologies can be effectively applied in media contexts. This research is also essential for identifying and developing standards and protocols for blockchain implementation in media management. With clear standards, these technologies can be consistent and effective (Khan, 2024). By developing a structured framework, the research aims to ensure that blockchain can be used optimally to protect content authenticity and copyright and create a more transparent and secure media ecosystem (Kuo, 2019).

This research will explore strategies to increase awareness and understanding of the benefits of blockchain among stakeholders in the media industry. This increased knowledge and adoption of technology is expected to overcome obstacles that may arise due to varying technology readiness levels. By identifying key factors influencing blockchain adoption, the study aims to provide practical recommendations that can assist content creators, distributors, and consumers in adopting this technology to improve the authenticity and protection of media content.

RESEARCH METHODOLOGY

Research Design

This research uses a qualitative research design with a case study approach. This approach was chosen to gain an in-depth understanding of blockchain implementation in media management systems and its impact on content authenticity and copyright protection (Maher, 2022). Case studies allow a comprehensive exploration of complex phenomena in authentic contexts and help identify key factors influencing the adoption and effectiveness of these technologies (Naeem, 2024).

Population and Samples

The study's population includes a variety of media organizations that have adopted blockchain technology in their management systems (Maulana, 2022). The study sample was selected purposively to ensure diversity in the types of organizations, including large media companies, independent publishers, and digital content distribution platforms. The sample consists of 10 media organizations spread across different geographical regions, each with experience using blockchain technology for content management.

Instruments

The research instruments used include semi-structured interview guides and analysis documents. The interview guide is designed to collect data from various stakeholders, including media managers, technology developers, and copyright attorneys. The interview explores their experience implementing blockchain, the perceived benefits, challenges faced, and strategies to overcome obstacles (Pinter, 2019). The analysis document involves a review of annual reports, internal publications, and technical documentation related to using blockchain in media management.

Procedures

The research begins with identifying and selecting media organizations that meet the inclusion criteria. Initial contact was made to explain the purpose of the study and obtain consent for participation (Saxena, 2023). According to respondents ' preferences and availability, interviews were conducted face-to-face and through digital communication platforms. Each interview is

recorded, and its transcription is analyzed using thematic analysis techniques to identify critical patterns and themes (Nicoletti, 2024). Additional data from analysis documents are also integrated to provide a more comprehensive context. The analysis results are then compared and synthesized to develop a deeper understanding of blockchain implementation in media management and identify best practices and recommendations for future deployment.

RESULT AND DISCUSSION

The research involved analyzing data from 10 media organizations that have adopted blockchain technology for content management. Data was collected through in-depth interviews and document reviews. Here is a table summarizing the main results of the data analysis.

Table 1. Table summarizing the main results of the data analysis

Organization	Content-Type	Key Blockchain Benefits	Key Challenges
Organization A	Video	Authenticity of Content	Scalability
Organization B	News Articles	Copyright Protection	Implementation Cost
Organization C	Music	Distribution Transparency	Technology Complexity
Organization D	E-book	Ownership Tracking	User Adoption
Organization E	Mixed Digital Content	Plagiarism Reduction	System Integration
Organization F	Photographers	Source Verification	Data Privacy
Organization G	Podcast	Explicit Distribution Rights	Regulatory Uncertainty
Organization H	Film	Automatic Royalty Payments	Technology Infrastructure
Organization I	Creative Content	Royalty Management	Education and Training
Organization J	Social Media	Secure Digital Identity	Changes in User Habits

Data shows that every media organization experiences various benefits from blockchain implementation, such as content authenticity, copyright protection, and distribution transparency. However, they also face significant challenges such as scalability, implementation costs, and technological complexity.

Data analysis shows that blockchain helps improve the authenticity of content by providing an immutable and verifiable record of transactions. This makes it harder for unauthorized parties to falsify or alter content. Organizations A and F report that they can verify the content source more efficiently and ensure its authenticity before distributing it to the public. This technology also helps reduce plagiarism and content theft, essential for protecting copyright. The data also shows that blockchain can provide greater transparency in content distribution. Organizations C and D report that they can more accurately track the distribution of their content and ensure that every party involved in the distribution receives its fair share. It helps manage content ownership and ensures copyrights are respected throughout the distribution chain.

The main challenges faced by organizations in implementing blockchain include scalability and cost. Organizations A and B report that although blockchain provides many benefits, they need help managing large-scale transaction data. The cost of implementing and maintaining this technology is also a barrier for some organizations, especially those with limited budgets. User adoption and education are also significant challenges. Organizations I and J note that the success of blockchain implementation depends not only on the technology itself but also on user understanding and acceptance. Training and education are needed to ensure all parties can use this technology effectively.

Further analysis shows that media organizations experience mixed benefits from blockchain implementation, including increased transparency and efficiency in copyright management. Organizations B and G report that blockchain assists them in tracking and managing content distribution rights, which is essential to ensure that all parties involved are pretty compensated. This technology enables the creation of a secure and immutable digital record of every copyright transaction, which helps reduce copyright disputes and infringements. Organizations D and H report that blockchain enables faster and more efficient royalty payments. By using smart contracts, payments can be processed automatically once predetermined conditions are met. This reduces administrative time and costs and ensures that content creators receive their payments in a timely manner.

The use of blockchain also helps verify and identify the source of the content. Organizations F and I use this technology to ensure that the content they distribute comes from legitimate sources and that copyright has been obtained correctly. This helps reduce the risk of spreading unauthorized content and protects the integrity of their platform. Nonetheless, challenges such as system integration and data privacy remain. Organizations E and J report that integrating blockchain technology with existing content management systems takes significant time and resources. In addition, there are concerns about how data stored in blockchains can be protected and used ethically, primarily regarding user privacy.

The increased transparency in copyright management reported by organizations B and G shows that blockchain can help create a more fair and efficient media ecosystem. By providing a secure digital record of every copyright transaction, the technology enables better monitoring and reduction of copyright disputes. This is important to ensure that all parties involved in content distribution are appropriately compensated and their rights are respected. As reported by organizations D and H, faster and more efficient royalty payments through intelligent contracts show that blockchain can reduce bureaucracy and improve payment speed and accuracy. Smart contracts enable automatic payments once certain conditions are met, reducing the need for manual administration processes and increasing creator satisfaction.

Verification and identification of the content source reported by organizations F and I show that blockchain can help ensure the authenticity and legality of distributed content. By providing an immutable record of the origins of content, this technology helps reduce the risk of spreading illegal content and protects the integrity of media platforms. However, challenges such as system integration and data privacy reported by organizations E and J show that although blockchain has many benefits, technical and ethical barriers must be overcome. Integrating new technologies with existing systems requires a significant investment of time and resources, and there are concerns about how data stored in blockchains can be protected and used ethically.

The link between increased transparency in copyright management and more efficient royalty payments suggests that blockchain can benefit the media industry significantly. Data from organizations B, G, D, and H shows that these technologies can help create a more fair and efficient ecosystem by providing secure digital records and automated payments through smart contracts. This shows that blockchain can be an effective tool to improve operational efficiency and creator satisfaction.

Verification and identification of the content source reported by organizations F and I show that blockchain can help ensure the authenticity and legality of distributed content. This is important to protect the integrity of media platforms and reduce the risk of spreading illegal content. This relationship shows that blockchain can effectively increase trust and credibility in digital content distribution. The system integration and data privacy challenges reported by organizations E and J

show that technical and ethical barriers need to be overcome to ensure successful blockchain implementation. Integrating new technologies with existing systems requires a significant investment of time and resources, and there are concerns about how data stored in blockchains can be protected and used ethically.

Data analysis shows that although blockchain has many potential benefits, significant challenges need to be overcome to ensure successful implementation. Data from various organizations show that successful blockchain implementation depends on overcoming technical and ethical barriers and increasing awareness and understanding of the benefits of this technology among stakeholders. A case study from Organization A shows how blockchain can be used to ensure the authenticity of video content. The organization uses blockchain to record every video production and distribution step, from creation to distribution to various platforms. Every change and transaction is recorded in the blockchain, creating a transparent and immutable audit trail. This helps organizations ensure that their videos are genuine and not manipulated.

Organization B, which focuses on news articles, uses blockchain to protect copyrights and manage content distribution. By recording every article in the blockchain, these organizations can trace the origin and ownership of content, ensuring that copyrights are respected. Moreover, this technology helps monitor content distribution and ensures that every party involved in the distribution process gets its fair share. Organization C, engaged in music, uses blockchain to increase the transparency of distribution and royalty payments. Blockchain allows them to record every song usage and distribution and ensure that royalty payments are made in a timely and accurate manner. This helps reduce copyright disputes and increase the satisfaction of artists and copyright owners.

Organization D, which focuses on e-books, uses blockchain for content ownership tracking and distribution. By recording every transaction and change in the blockchain, these organizations can ensure that the e-books they distribute are legitimate and do not infringe copyright. This technology also helps ensure that authors and publishers receive appropriate payment for each sale or distribution of the eBook. The case study of Organization A shows that blockchain can provide an effective solution to ensure the authenticity of video content. By recording every step of production and distribution in the blockchain, these organizations can create a transparent and immutable audit trail. This helps them to ensure that the videos they distribute are genuine and not manipulated, which is essential for maintaining the integrity and credibility of the content.

The case study of Organization B shows that blockchain can be used to protect copyrights and manage the distribution of news articles. By recording every article in the blockchain, these organizations can trace the origin and ownership of content, ensuring that copyrights are respected. The technology also helps in monitoring the distribution of content. It ensures that every party involved in the distribution process gets its fair share, essential for creating a more transparent and fair media ecosystem. The case study of Organization C shows that blockchain can increase the transparency of distribution and royalty payments in the music industry. By recording every song's usage and distribution within the blockchain, the organization can ensure that royalty payments are made promptly and accurately. This helps reduce copyright disputes and increase the satisfaction of artists and copyright owners, which is essential to support a healthy and sustainable music industry.

Organization D's case study shows that blockchain can be used to track the ownership and distribution of e-books. By recording every transaction and change in the blockchain, these organizations can ensure that the e-books they distribute are legitimate and do not infringe copyright. The technology also helps ensure that authors and publishers receive appropriate payment for any sale or distribution of e-books, which is essential to support a fair and sustainable

publishing industry. The relationship between content authenticity and distribution transparency reported by Organizations A and C suggests that blockchain can provide a comprehensive solution to address challenges in media content management. Data shows that by recording every step of production and distribution within the blockchain, organizations can ensure that the content they distribute is genuine and not manipulated and that every party involved gets its fair share.

The relationship between copyright protection and distribution management reported by Organizations B and D suggests that blockchain can be used to create a more transparent and fair media ecosystem. Data shows that by recording every transaction and change in the blockchain, organizations can trace the origin and ownership of content and ensure that copyrights are respected and payments are made promptly. The challenges organizations face in implementing blockchain, as reported by Organizations E and J, show that technical and ethical barriers need to be overcome to ensure the successful implementation of this technology. The data shows that integrating new technologies with existing systems requires a significant investment of time and resources, and there are concerns about how data stored in blockchains can be protected and used ethically. Data analysis shows that although blockchain has many potential benefits, significant challenges need to be overcome to ensure successful implementation. The relationship between various aspects of blockchain implementation suggests that the success of this technology depends on the ability to overcome technical and ethical barriers and increase awareness and understanding of the benefits of this technology among stakeholders.

This research shows that implementing blockchain technology in media management systems can significantly improve content authenticity and copyright protection (Nürnberg, 2020). Organizations that adopt blockchain report key benefits such as guaranteed authenticity of content, transparency of distribution, and efficiency in royalty payments. However, key challenges such as scalability, implementation costs, and system integration still need to be overcome to achieve broader applicability (Otta, 2022).

The data shows that blockchain allows the creation of immutable records of transactions that can be verified by all parties involved. This makes manipulation and falsification of content more difficult, which is crucial for protecting copyright and ensuring the authenticity of the content. Case studies from various media organizations show that blockchain can solve this problem practically. Organizations that use blockchain to track content distribution and manage royalty payments report increased transparency and efficiency. Using smart contracts, payments can be processed automatically once predefined conditions are met, reducing the need for manual administration processes. This helps ensure that content creators receive their payments promptly and fairly.

However, challenges such as integrating existing systems with blockchain technology and concerns about data privacy still need to be addressed. Organizations report that incorporating these new technologies requires significant time and resources (Yu, 2023). In addition, there are concerns about how data stored in blockchains can be protected and used ethically. The results align with previous research showing that blockchain technology can improve transparency and security in various sectors, including finance and logistics. However, the study adds a new dimension to the focus on the media industry and shows how blockchain can be used to protect content authenticity and copyright. Research by Crosby et al. (2016) also supports these findings, suggesting that blockchain can provide an immutable and transparent record of transactions.

This research differs from other studies that focus more on the technical aspects of blockchain without considering its application in the context of the media industry. This research provides deeper insights into how blockchain can be integrated into media management systems and the specific benefits it can gain (Saxena, 2023). In addition, the study highlights the challenges the

media industry faced in adopting these technologies, which should have been considered in previous studies. The study's findings are also consistent with studies conducted by Tapscott and Tapscott (2016) that show that blockchain could revolutionize how transactions are conducted across various industries. However, this study focuses on the issue of copyright and content authenticity, which is particularly relevant for the media industry (ZHANG, 2024). This shows that blockchain can improve operational efficiency and provide better protection of intellectual rights.

This research also differs from more general studies of blockchain, such as those conducted by Nakamoto (2008), by focusing on blockchain applications in media management. This shows that although blockchain technology has many potential applications, each industry faces unique challenges and opportunities that require a tailored approach (Feng, 2023). The results of this study signify that blockchain technology has great potential to overcome the challenges faced by the media industry regarding content authenticity and copyright protection. The increased transparency and security offered by blockchain can help media organizations trace the origins of content, ensure that copyrights are respected, and reduce the risk of plagiarism and content theft. This shows that blockchain can be a powerful tool for creating a more fair and reliable media ecosystem (Zhong, 2024).

The benefits reported by organizations adopting blockchain show that the technology can improve operational efficiency and reduce administrative costs. Using smart contracts to manage royalty payments, for example, shows that blockchain can automate complex and time-consuming processes, reducing manual workload and the risk of human error. This signifies that blockchain adoption can provide significant economic benefits to media organizations. The challenges faced, such as scalability and system integration, show that although blockchain has many benefits, technical barriers need to be overcome to ensure successful implementation. This signifies that technology developers and media organizations need to work together to develop solutions to address these challenges and ensure that blockchain can be seamlessly integrated into existing systems.

Concerns about data privacy also point out that blockchain adoption should be accompanied by policies and practices that ensure the protection of user data (He, 2024). This signifies that media organizations must consider the ethical implications of using these technologies and ensure that they comply with applicable data privacy regulations. This is important to maintain user trust and ensure that the benefits of this technology can be achieved without compromising individual privacy rights.

The main implication of the results of this study is that blockchain technology can provide practical solutions to address the challenges faced by the media industry regarding content authenticity and copyright protection. The increased transparency and security offered by blockchain can help media organizations trace the origins of content, ensure that copyrights are respected, and reduce the risk of plagiarism and content theft. This shows that blockchain can be a powerful tool for creating a more fair and reliable media ecosystem.

Using smart contracts to manage royalty payments shows that blockchain can automate complex and time-consuming processes, reducing manual workload and the risk of human error. This suggests that blockchain adoption can benefit media organizations significantly economically, improve operational efficiency, and reduce administrative costs. It can also increase creator satisfaction by ensuring that they receive payments in a timely and fair manner.

The challenges faced, such as scalability and system integration, show that although blockchain has many benefits, technical barriers need to be overcome to ensure successful implementation. This suggests that technology developers and media organizations need to work

together to develop solutions to address these challenges and ensure that blockchain can be seamlessly integrated into existing systems. This is important to achieve wider adoption and ensure all parties benefit from this technology.

Concerns about data privacy suggest that blockchain adoption should be accompanied by policies and practices that ensure the protection of user data. This suggests that media organizations should consider the ethical implications of using these technologies and ensure that they comply with applicable data privacy regulations. This is important to maintain user trust and ensure that the benefits of this technology can be achieved without compromising individual privacy rights.

The results showed that blockchain technology can improve content authenticity and copyright protection due to its decentralized nature and transparency. Blockchain provides an immutable record of transactions that can be verified by all parties involved, making manipulation and falsification of content more difficult. This is important to protect copyright and ensure that the content distributed is original and legitimate.

Smart contracts allow for the automation of complex and time-consuming processes, such as royalty payments. Smart contracts can be programmed to execute payments automatically once conditions are met, reducing the need for manual administrative processes and the risk of human error. This improves operational efficiency and ensures that content creators receive their payments promptly and fairly.

Challenges such as scalability and system integration indicate that blockchain implementation in media management systems is still in its infancy and requires further development. Integrating new technologies with existing systems requires a significant investment of time and resources and solutions that can address complex technical problems (Zhong, 2024). This suggests that technology developers and media organizations must work together to develop solutions to address these challenges and ensure successful implementation.

Concerns about data privacy suggest that blockchain adoption should be accompanied by policies and practices that ensure the protection of user data. The data stored in the blockchain is transparent and accessible to all parties involved, so it is essential to ensure that it is protected and used ethically. This suggests that media organizations should consider the ethical implications of using these technologies and ensure that they comply with applicable data privacy regulations. The next step is to expand this research to include more media organizations and test blockchain implementations in various contexts. Further research is needed to evaluate the long-term impact of blockchain use on content authenticity and copyright protection. This will help ensure that the findings of this study can be generalized and widely applied in the media industry.

Developing training programs to increase stakeholders' understanding and awareness of the benefits of blockchain is also very important. This training will help content creators, distributors, and consumers understand how to use these technologies effectively and overcome possible barriers. It will also help increase the adoption of blockchain technology across the media ecosystem.

Implementing policies supporting blockchain use in media management is also necessary. Policymakers should consider the findings of this study and develop regulations that support the integration of blockchain technology in media management systems. This policy should include protecting the privacy of user data and ensuring that technology is used ethically and responsibly. Further research is also needed to develop technical solutions to address scalability and system integration challenges. This will help ensure blockchain technology can be implemented smoothly and efficiently within existing media management systems. This solution will help overcome

technical barriers and ensure that all parties involved in the media industry can benefit from this technology.

CONCLUSION

This research shows that implementing blockchain technology in media management systems can significantly improve content authenticity and copyright protection. Blockchain enables the creation of immutable and verifiable transaction records, reducing the risk of counterfeiting and content manipulation. Organizations adopting this technology reported increased transparency in content distribution and efficiencies in the management of royalty payments. These findings suggest that blockchain can address some of the significant challenges the media industry faces, such as plagiarism and content theft. By providing a more secure and transparent solution for content management, blockchain helps ensure that copyrights are respected and content creators receive fair compensation. The findings provide new insights into blockchain's potential to revolutionize managing and distributing media content.

The research significantly contributes by combining qualitative approaches and case studies to evaluate blockchain implementation in media management. This method allows for an in-depth exploration of how these technologies can be effectively applied and what challenges they may face. By providing empirical evidence on the benefits and challenges of blockchain implementation, the research helps inform technology developers and media industry stakeholders on how best to adopt the technology. The research also develops a conceptual framework for understanding how blockchain can improve content authenticity and copyright protection. By demonstrating that blockchain can provide an immutable and transparent record of transactions, the research provides a solid foundation for the further development and application of this technology in media management. This helps pave the way for advanced study that could broaden our understanding of blockchain's potential in various media applications.

The study's limitations include a limited sample size and a focus on media organizations adopting blockchain. The study's results may not be fully generalizable to all media organizations, especially those that have not adopted this technology. Further research is needed to test these findings in a broader context and with a more diverse sample to provide a more comprehensive picture of blockchain's effectiveness in media management. The study also relied on interview data and document reviews, which can be susceptible to respondent bias and interpretation limitations. To increase the validity of the findings, advanced research can use quantitative methods and experiments to evaluate the impact of blockchain more objectively. Future research could also explore the long-term implications of blockchain use on content authenticity and copyright protection and develop technical solutions that can address the challenges identified in the study.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

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