



RECEIVED 10 August 2026
ACCEPTED 25 September 2026
PUBLISHED 31 October 2026

CITATION

Ruhati D, Soemartono T, Sanusi A, Rachmatsyah TH, (2026). Implementation of Blockchain Policy to Strengthen the Creative Economy Ecosystem at the Ministry of Creative Economy. *Ilomata International Journal of Social Science*. 7 (4), 1-10.
doi: 10.61194/ijss.v7i4.2733

TYPE Original Research

PUBLISHED 31 October 2026
DOI 10.61194/ijss.v7i4.2733
VOL 7 Issue 4 October 2026

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Implementation of Blockchain Policy to Strengthen the Creative Economy Ecosystem at the Ministry of Creative Economy

Dessy Ruhati¹, Triyuni Soemartono², Anwar Sanusi³, T. Herry Rachmatsyah⁴

¹²³⁴Universitas Prof. Dr. Moestopo (Beragama), Jakarta, Indonesia

Correspondence: dessysurianingrat@gmail.com¹

Abstract

Protecting and utilizing intellectual property (IP) are strategic aspects of the creative economy, yet the sector faces challenges in transparency, data security, and governance efficiency. Blockchain technology—characterized by decentralization, transparency, and immutability—holds the potential to enhance trust and effectiveness in IP rights management, as demonstrated by implementation policies in the United States, South Korea, Japan, and Saudi Arabia. Using the Indonesian context as the primary case study alongside international references, this qualitative policy study examines regulatory, infrastructure, and creative economy conditions. The research involved ten informants representing key stakeholders, including the Ministry of Communication and Digital Affairs, the Ministry of Tourism and Creative Economy, Bappenas, the Directorate General of Intellectual Property, the Indonesian Blockchain Association, tech startups, developers, academia, and digital creators. The findings indicate that blockchain policies can improve transparency, accountability, and efficiency in ownership registration, copyright protection, and royalty distribution. However, implementation remains suboptimal due to constraints such as a lack of specific regulations, limited digital infrastructure, insufficient human resource capacity, and low technological literacy. To address these challenges, this study recommends a "Trust-Based Blockchain Governance Model," which positions blockchain as a trust infrastructure within the creative economy ecosystem. Ultimately, successful blockchain adoption requires an integrated, adaptive, and sustainable approach, driving national economic growth through policy consistency, institutional capacity building, and cross-sector collaboration.

KEYWORDS

blockchain; intellectual property; creative economy; smart government.

Introduction

In the digital era, the intersection of blockchain technology and smart government offers an innovative solution to strengthen Intellectual Property Rights (IPR) within the creative economy (Qin, 2024; Sujaini, 2023). This dynamic sector contributes approximately 3% to global GDP according to UNESCO. In Indonesia, it is a government priority, contributing 7.4% to the national GDP in 2022 (Chusumastuti et al., 2024) across fields like art, music, film, design, fashion, and technology (Fitriani et al., 2024).

While IPR is vital for safeguarding creators and enabling monetization (Sabijanto, 2024), current frameworks are inadequate against digital piracy (H. Qin, 2024). In 2023, Indonesia's IPR contribution to GDP stood at just 7%, vastly trailing the US (41%) and the EU (47%) (Edyson et al., 2024). This gap is largely driven by complex, time-consuming registration processes that deter creators (Adani & Santoso, 2023; Esu, 2022; Tripathi et al., 2023).

Blockchain addresses these challenges by offering decentralized, transparent, and secure data storage (Esu, 2022; Tripathi et al., 2023). It streamlines asset registration,

ownership verification, NFT monetization, and royalty management (Alqarni, 2025; Chuba & Pazelli, 2023; D et al., 2024).

Globally, the EUIPO utilizes "IP Registers in Blockchain" for secure data exchange and supply chain authentication (EUIPO, 2023), while the US incorporates NFTs into IPR recordation for licensing transparency (USPTO, 2024). In Asia, South Korea developed the blockchain-based KIPRIS model to accelerate patent registration (World Bank, 2021a), and Japan uses it to verify creative copyrights (Japan Patent Office, 2023). Saudi Arabia has similarly integrated blockchain into its trademark system via SAIP (Alshayea et al., 2023).

Indonesia is currently exploring this technology. In 2023, the Ministry of Law and Human Rights initiated a study on integrating blockchain into copyright and trademark systems (Sutrisno & Putra, 2025), while institutions like BRIN examined its potential for ownership verification (Adani, N., & Santoso, B, 2023). Although this transformation is a crucial strategic step to sustain digital innovation (Chandratre & Pathak, 2020), its implementation in Indonesia still faces several regulatory and

technical obstacles (Girindra, 2023).

Methods

This study employs an interpretive qualitative approach within a policy study framework to examine Indonesia's blockchain policy formulation process (Creswell & Plano Clark, 2018; Sugiyono, 2019). The research subjects comprise key informants with extensive experience in policy implementation and blockchain innovations, including policymakers, technology practitioners, academic researchers, and creative economy players involved with NFTs, digital rights management, or smart contracts. (see Table 1). Data collection follows an exploratory qualitative approach using two primary methods:

- In-depth Interviews: Semi-structured interviews with open-ended question guides to gather strategic insights.

Table 1. Informant criteria

No.	Informant Categories	Potential Organizations/Institutions	Role and Relevance
1.	Central Government (Policymakers)	Ministry of Communication and Digital Affairs, Ministry of Tourism and Creative Economy, Bappenas, Directorate General of Intellectual Property (Ministry of Law and Human Rights)	Providing policy perspectives and national strategic direction for blockchain adoption and the strengthening of the IP-based creative economy
2.	Technology & Digital Industry Practitioners	Indonesian Blockchain Association, tech startups, blockchain system developers, IT consultants	Offering technical and implementation-oriented insights regarding blockchain application in the public sector and the creative economy
3.	Academics & Researchers	Universities, research institutions	Providing theoretical, conceptual, and evaluative analyses of blockchain policies and smart governance
4.	IP-based Creative Economy Players	Digital artists, game developers, designers, content creators	Sharing empirical experiences regarding the use of blockchain in intellectual property protection and monetization

Table 2. Benchmarking Instrument

No	Indicators	Description
1.	Regulatory and governance aspects	Examine the extent to which the country possesses a national legal and policy framework governing blockchain implementation, including licensing, data standardization, and legal certainty in digital transactions.
2.	Institutional structure	Assess the defined roles of government and non-government entities—such as policy authorities, regulators, research institutions, and industry partners—in developing the blockchain ecosystem.
3.	Blockchain-based IP protection mechanism	Examine the use of blockchain for the registration, verification, and tracking of intellectual property (IP) ownership, as well as the digital monetization of creative works.
4.	Collaboration model	Analyze collaboration models involving government, industry, academia, and the public (penta helix collaboration) within the blockchain ecosystem.
5.	Technological aspects	Evaluate the readiness of technology infrastructure, interoperability, and security standards for blockchain implementation in the public sector.
6.	Best practices	Identify best practices and successful strategies for blockchain adoption by other governments that can be adapted to the Indonesian context.

Table 3. Explanation of the selection of comparator countries for the benchmarking analysis.

No.	Country	Explanation
1.	United States	The United States is a global hub for technological innovation—including blockchain and the digital creative economy—driven by blockchain innovations from major technology companies and bolstered by robust copyright and patent protection systems.
2.	United Kingdom	The UK is a country with a robust fintech ecosystem and strong intellectual property protection, distinguished by the digitalization of the UK Intellectual Property Office's services—driven by technology innovation policies and a regulatory sandbox.
3.	Estonia	Estonia is one of the most advanced nations in the implementation of digital government and blockchain within its administrative systems, distinguished by its use of blockchain for national data security and its highly advanced digital identity and e-government infrastructure.
4.	South Korea	South Korea possesses a robust ecosystem in the digital creative and blockchain technology industries, distinguished by national policies for the blockchain economy—particularly the development of the Busan Blockchain Special Zone.
5.	China	China is one of the countries most aggressive in developing its national blockchain, notably through the Blockchain Service Network (BSN), which is backed by a national strategy for blockchain technology.
6.	Singapore	Singapore is known as one of the countries with the most advanced blockchain ecosystems and digital economies in Asia, distinguished by its Smart Nation Initiative and strong support for fintech and blockchain innovation.

- b. Document Analysis: Analysis of official documents, scholarly articles, regulations, and international benchmarks to identify implementation barriers.

Ten informants were purposively selected from critical institutions, including Kemenkomdigi, Kemenekraf, Bappenas, the Directorate General of Intellectual Property, the Indonesian Blockchain Association, tech startups, and content creators. Finally, the gathered data were systematically analyzed using NVivo software for thematic coding and pattern analysis (Jackson & Bazeley, 2019; Miles et al., 2014)

NVivo software was used to assist in the thematic coding and pattern analysis of qualitative data derived from in-depth interviews, FGDs, policy documents, and official reports. This analysis aimed to identify key themes regarding perceptions, readiness, and the potential for blockchain adoption across various informant groups (government, creative economy actors, academics, and the technology industry). In this study, NVivo was employed to organize, code, and analyze textual data from interviews and policy documents (Jackson & Bazeley, 2019)

The challenges faced by qualitative researchers can be addressed through the use of NVivo, an application developed by QSR International. NVivo is a suite of tools designed to manage data from diverse sources—such as books, research reports, historical documents, journal articles, website content, online news, conference proceedings, memos, field notes, bibliographic annotations, and even researchers' personal journals (Ayuning & Sardi, 2020).

Content analysis is employed to identify the meaning, intent, and policy direction found in official documents and interviews (Krippendorff, 2019). The output of this analysis is a policy narrative map—a visualization illustrating the relationships between objectives and instruments, while also identifying constraints and obstacles regarding blockchain implementation. The stages of conducting this content analysis are as follows:

- a. Document Selection. Selecting strategic documents such as the RPJMN (National Medium-Term Development Plan), SPBE (Electronic-Based Government System framework), the Presidential Regulation on the Digital Economy, reports from the Ministry of Tourism and Creative Economy (Kemenparekraf), and other relevant documents.
- b. Unitization and Categorization. Defining units of analysis—such as paragraphs, statements, or policy excerpts—related to blockchain governance and the intellectual property economy.
- c. Frequency & Context. Measuring the occurrence of key concepts such as “blockchain policy,” “data sovereignty,” “digital innovation,” and “creative economy ecosystem.”
- d. Contextual Interpretation. Interpreting the meaning of each category to assess the direction of policy formulation and its alignment with smart government principles.

Benchmarking analysis is a systematic process of comparing an organization's products, services, processes, and practices against those of other organizations recognized as “best-in-class” or direct competitors, to identify performance gaps and learn how to make improvements (Dattakumar & Jagadeesh, (2003); Tapscott & Tapscott, (2016)). In this study, benchmarking is conducted to compare blockchain policies in Indonesia with those of other countries that have successfully integrated this technology into their digital government systems. The benchmarking results will be visualized using comparative tables and a policy radar chart to assess Indonesia's readiness for blockchain implementation in “smart government.” The steps involved in the analysis are as follows:

Identification of comparator countries: United States, United Kingdom, Estonia, South Korea, China and Singapore were selected due to their success in

- a. Implementing blockchain for public services and intellectual property (IP) management.
- b. Analysis of comparative dimensions: This may include regulatory and governance aspects, institutional structures, blockchain-based IP protection mechanisms, and collaboration models among government, industry, and academia.
- c. Extraction of best practices: Identifying key elements that can be adapted to the Indonesian context.
- d. Conducting a policy gap analysis: Illustrating the gap between Indonesia's current conditions and international standards to serve as a basis for policy formulation recommendations.

In this study, the benchmarking analysis instrument is based on the indicators of each variable, as follows (see Table 2 and Table 3).

Result and Discussion

Analysis of the State of Blockchain Implementation in Smart Government in Indonesia.

NVivo analysis indicates a shared consensus among informants that blockchain technology is not intended to replace existing digital systems, but rather to complement them by providing transparent, immutable, and traceable intellectual property ownership records.

The emerged child nodes highlight key elements required to strengthen digital governance: integrating digital services, ensuring system transparency and accountability, enhancing data security, and improving system interoperability. Informants also emphasized the necessity of regulatory strengthening, system standardization, and robust digital infrastructure development to support government ecosystems.

Ultimately, the parent and child node structure demonstrates that blockchain implementation drives a broader transformation toward integrated, accountable, and transparent digital governance (Table 4). This model positions blockchain as the foundation for building public trust, reinforcing intellectual property protection, and fostering a digital innovation-driven creative economy. Consequently, this node mapping offers a comprehensive conceptual framework for integrating blockchain into a sustainable smart government ecosystem.

The subsequent visualization displays the analysis results for the parent node “Blockchain-Based Smart Government Model,” illustrating various child nodes that represent key components in the development of this blockchain-based digital governance model. Elements identified in the analysis include government as an enabler, trust-based blockchain governance, blockchain vocational training, startup programs, and community-based governance. The size of each box reflects the frequency with which a theme appeared in the interview data, thereby highlighting the most dominant components in discussions regarding the development of the smart government model (Figure 1).

Based on the visualization, the government's role as an enabler emerges as a dominant component of this governance model. This indicates that the government is viewed as a crucial facilitator, providing the regulatory frameworks, system standards, and policy support necessary to drive blockchain technology implementation within the creative economy and intellectual property ecosystems. Furthermore, the concept of trust-based blockchain governance serves as a vital element in establishing a digital governance system that is transparent, accountable, and trustworthy.

Informants also highlighted the importance of developing blockchain vocational programs, supporting technology startups, and strengthening community-based governance as integral parts of the innovation ecosystem. Thus, the Blockchain-Based Smart Government model represents a digital governance approach that emphasizes the government's role as an enabler while fostering collaboration among government, industry, academia, and the community to build a sustainable technology ecosystem.

Files\N4 - § 2 references coded [0.83% Coverage]

Reference 1 - 0.51% Coverage

The government acts as an orchestrator of policy and governance

Reference 2 - 0.32% Coverage

The government functions as an orchestrator

Files\N5 - § 1 reference coded [1.50% Coverage]

Reference 1 - 1.50% Coverage

The government acts as a facilitator and integrator, ensuring that developed applications can interconnect and meet established standards.

Files\N7 - § 1 reference coded [0.97% Coverage]

Reference 1 - 0.97% Coverage

blockchain as public trust infrastructure, where the village government acts as an ecosystem facilitator rather than a data controller

Based on Table 4, the NVivo analysis of the "Government as enabler" child node, several informants asserted that in a blockchain-based governance model, the government no longer acts as the system's primary controller but rather as an ecosystem facilitator and guide. One informant noted that the government functions as an orchestrator of policy and governance, ensuring that the various actors within the ecosystem operate in a coordinated manner.

Other informants emphasized the government's role as a facilitator and integrator, guaranteeing that the applications and systems being developed are interoperable and meet established standards. Furthermore, there is a view that when utilizing blockchain as public trust infrastructure, government bodies—including local entities such as village governments—are better suited to acting as ecosystem facilitators rather than data controllers. These findings indicate that the government's role in a blockchain-based smart government

model is shifting toward the regulation, facilitation, and orchestration of a collaborative digital ecosystem.

Files\N1 - § 1 reference coded [1.47% Coverage]

Reference 1 - 1.47% Coverage

Blockchain has the potential to shift IP protection systems from an administrative approach to a digital trust-based governance model that is more efficient and equitable for creative economy players.

Files\N6 - § 1 reference coded [0.85% Coverage]

Reference 1 - 0.85% Coverage

Blockchain can also strengthen ecosystem trust, as all transactions and uses of creative works are recorded in an accountable manner.

Blockchain offers the benefit of providing a transparent, immutable, and automated record-keeping system through smart contracts. Literature indicates that these features can enhance efficiency and reduce transaction costs (De Filippi & Wright, (2018); Tapscott & Tapscott, (2016)). Furthermore, research in the digital economy confirms that blockchain enables a fairer distribution of economic value through automated royalty and licensing mechanisms (De Filippi & Wright, 2018). This aligns with the NVivo results, which show a prevalence of discussions regarding smart contract-based automated royalty systems within the creative economy context.

International benchmarking reinforces these findings. Countries such as Estonia have implemented blockchain in their digital government systems to ensure public data integrity (KSI Blockchain). Meanwhile, South Korea has developed the Busan Blockchain Special Zone as an innovation hub, and Singapore has integrated blockchain into its fintech and public service ecosystems. According to an OECD report (OECD, 2020), these nations have successfully leveraged blockchain to improve public service efficiency and strengthen public trust in digital systems.

These countries were selected due to their significant progress in digital technology development, creative economy policies, and intellectual property protection systems integrated with technological innovation. Employing a benchmarking approach, this study seeks to identify effective policy practices and

Table 4. Parent node and child node structure for the Blockchain-Based Smart Government Model theme

Codes	Aggregate number of coding references	Aggregate number of items coded
Nodes\Blockchain-based Smart Government Model	9	6
Nodes\Blockchain-based Smart Government Model\Community-based governance	1	1
Nodes\Blockchain-based Smart Government Model\Government as enabler	4	3
Nodes\Blockchain-based Smart Government Model\GovTech startup program	1	1
Nodes\Blockchain-based Smart Government Model\Trust-based blockchain governance	2	2
Nodes\Blockchain-based Smart Government Model\Blockchain vocational training	1	1

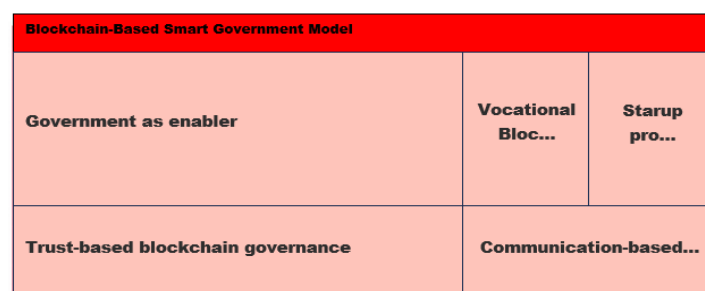


Figure 1. Visualization of the Blockchain-Based Smart Government Model Hierarchy

understand the governance models these nations use to optimize blockchain technology within the digital economy and creative industries.

The benchmarking analysis matrix is structured around five key criteria (Table 5): regulatory and governance aspects, institutional structures, blockchain-based intellectual property protection mechanisms, collaboration models, and technological aspects. These five areas serve as an analytical framework to compare how each country develops policies and technology ecosystems that support blockchain implementation, thereby strengthening creative industries and protecting digital intellectual property rights. Through this matrix, the study identifies policy patterns, innovation ecosystem characteristics, and the level of technological readiness in each country. The analysis results subsequently form the basis for a benchmarking synthesis, offering a reference for developing blockchain policy models relevant to the context of digital governance and the strengthening of Indonesia's creative economy ecosystem.

Nevertheless, significant challenges regarding blockchain implementation remain. NVivo results indicate that regulatory aspects and legal certainty are the dominant issues. This is reinforced by literature stating that regulatory ambiguity is a primary barrier to blockchain adoption (Lemineux, 2021). In the context of public policy, this situation reflects a "policy

gap"—a disparity between technological advancement and regulatory readiness. An analysis of policy documents also reveals that Indonesia lacks a legal framework specifically governing blockchain in intellectual property management. Beyond regulation, other challenges include digital infrastructure readiness and system interoperability. The E-Government Survey 2022 emphasizes that the successful implementation of digital technology relies heavily on system integration and data standardization (Department of Economic and Social Affairs, 2022). NVivo analysis indicates the presence of "siloed systems" within the Indonesian government's digital governance, which hinders blockchain integration. Countries such as Estonia and Singapore have addressed this issue through integrated national digital architectures, thereby enabling more effective implementation of new technologies.

Significant opportunities exist for blockchain development within the context of "Smart Government." Literature suggests that blockchain can serve as a foundation for trust-based governance, enhancing transparency and accountability (Ølnes et al., 2017). NVivo findings also highlight the importance of ecosystem collaboration through a "quadruple helix" approach, involving government, industry, academia, and the community. According to the (World Economic Forum (2020), successful blockchain implementation is largely

Table 5. Analysis matrix based on benchmarking criteria.

Country	Regulatory and Governance Aspects	Institutional Structure	Blockchain-based IP protection mechanism	Collaboration Models	Technological Aspects
United States	Technology regulations are sectoral in nature yet allow significant scope for technological innovation.	Robust institutional structure comprising patent and copyright offices and technology regulators	Blockchain developed by the private sector for digital copyright management and content distribution	Dominant collaboration among the private sector, tech startups, universities, and the creative industry	Global technology ecosystem with innovation hubs such as Silicon Valley
United Kingdom	Progressive fintech regulations and regulatory sandboxes support digital technology innovation.	National IP protection agencies and financial sector regulators support technological innovation	Digitization of IP systems and exploration of blockchain for digital copyright management	Collaboration among the technology sector, research institutions, and the global creative industry	Advanced digital technology ecosystem with technology innovation hubs across various cities
Estonia	Integrated digital regulations operate through an e-government ecosystem that supports data security and government system interoperability.	Centralized institutional structure featuring government information system and cybersecurity agencies	IP protection implemented through the digitization of registration and data security integration using blockchain technologies such as KSI	Collaboration among the government, tech startups, and the digital innovation sector to develop public technology solutions	Advanced digital infrastructure featuring national data interoperability systems and digital identity
South Korea	National digital innovation policies and special blockchain zones, such as the Busan Blockchain Zone	Government technology agencies and national IP offices manage digital innovation and IP protection	Development of digital copyright management systems exploring blockchain for creative content distribution	Strong collaboration among the government, technology companies, and the creative industry	Highly advanced digital infrastructure and internet networks with significant investment in technology research
China	Centralized technology regulation aligned with a national blockchain development strategy	Central government agencies direct digital technology development and IP protection	Utilization of blockchain in digital copyright protection systems and online content platforms	Government-led collaboration supported by major technology companies	Extensive digital technology infrastructure with the development of the Blockchain Service Network (BSN)
Singapore	Innovative regulation through "Smart Nation" policies and regulatory sandboxes for digital technology development	Digital government agencies and fintech regulators play a role in developing blockchain innovation and the digital economy	Digital IP administration systems via online platforms and exploration of blockchain for digital rights management	Triple-helix collaboration among the government, the technology industry, and universities	Advanced digital technology infrastructure supported by research and innovation in fintech and blockchain

determined by multi-stakeholder collaboration and the readiness of the innovation ecosystem.

Regarding development programs, various studies emphasize the importance of a phased approach involving pilot projects, regulatory sandboxes, and digital talent development (OECD, 2025). NVivo results further indicate that initiatives such as the National Blockchain Initiative, startup incubation, and innovation competitions serve as crucial strategies for driving technology adoption. Countries like the UK and Singapore have successfully utilized sandboxes as policy instruments to test blockchain innovations in a controlled environment prior to widespread implementation.

Based on Table 6, international benchmarking reinforces these findings. Countries such as Estonia have implemented blockchain within their digital governance systems to ensure the integrity of public data (KSI Blockchain). Meanwhile, South Korea has developed the Busan Blockchain Special Zone as an innovation hub, and Singapore has integrated blockchain into its fintech and public service ecosystems. According to an OECD report (OECD, 2020), these nations have successfully leveraged blockchain to enhance public service efficiency and strengthen public trust in digital systems.

Nevertheless, the challenges associated with blockchain implementation remain significant. NVivo analysis indicates that regulatory aspects and legal certainty are dominant issues. This is corroborated by literature stating that regulatory ambiguity is a primary barrier to blockchain adoption (Lemineux, 2021). In the context of public policy, this situation reflects a policy gap—an imbalance between technological advancement and regulatory readiness. An analysis of policy documents also reveals that Indonesia lacks a legal framework specifically governing blockchain in the management of intellectual property.

Beyond regulations, blockchain integration in Indonesia faces structural challenges, particularly digital infrastructure readiness and system interoperability. NVivo results highlight "silos systems" within governance, creating a stark contrast

to integrated architectures in Estonia and Singapore (Department of Economic and Social Affairs, 2022). These obstacles are systemic, rooted heavily in institutional readiness and governance frameworks rather than the technology itself (Voshmgir, 2020).

Conversely, significant opportunities lie in establishing trust-based governance to enhance transparency, efficiency, and intellectual property rights (IPR) management (Øines et al., 2017; Tasca & Piselli, 2019). Achieving this requires an ecosystem-based approach using a phased program development model—such as pilot projects and regulatory sandboxes—similar to strategies utilized by the UK and Singapore (OECD, 2025).

A key driver for sustainable adoption is the "penta-helix" model, which fosters cross-sector collaboration among government, industry, academia, communities, and financial institutions (Chesbrough, 2003; World Economic Forum, 2020). At the institutional level, this model combats fragmentation through a "whole-of-government" approach, ideally executed via a dedicated blockchain task force or a GovTech model (OECD, 2020).

Ultimately, these findings converge into a comprehensive "Trust-Based Blockchain Governance Model." This framework positions blockchain as a decentralized "trust infrastructure" where immutability, distributed ledgers, and smart contracts eliminate the need for traditional intermediaries (Kshetri, 2018; Swan, 2015). By aligning technical capabilities with policy integration and multi-stakeholder synergy, this model establishes digital trust as the foundation for modern public governance and creative economy expansion (Tapscott & Tapscott, 2016).

Analysis of Barriers to and Support for Blockchain Implementation

The most prominent obstacles relate to regulatory aspects and legal certainty. NVivo results highlight the child nodes "Non-

Table 6. Analysis of Potential, Benefits, Challenges, and Opportunities: Blockchain Development Program

Aspect	NVivo Analysis Results	Policy Document Analysis (Content Analysis)	International Benchmarking	Synthesis of Findings
Potential	- Proof of ownership - Traceability, - Smart contract	Digital transformation policies support the digitalization of intellectual property, but do not yet specifically address blockchain	- Building e-government systems modeled after Estonia - Developing a Blockchain Zone as a pilot project in a major city - Developing a Blockchain Service Network using a penta-helix approach	Blockchain has the potential to serve as trust infrastructure for the development of intellectual property in the creative economy sector.
Benefits	- Transparency, - Immutable - Record, - Transaction efficiency	Promoting public service accountability & IP protection	Delivering digital and fintech service efficiency, similar to the UK and Singapore	Enhancing transparency, efficiency, and the distribution of economic value
Challenges	- Regulation - Human resources - Low adoption - Interoperability	There are no specific regulations yet (policy gap).	Developed countries already have sandboxes and adaptive regulations.	Key challenges lie in regulations and ecosystem readiness.
Opportunities	- Multi-actor collaboration - Trust-based governance	National digital transformation agenda	The quadruple helix model in various countries	Opportunities lie in ecosystem integration and cross-sector collaboration
Development Program	- Pilot project - Startup incubation - Digital ecosystem	National program for digital and creative economy transformation	- Strengthening the regulatory sandbox - Developing a national blockchain strategy	An ecosystem-based national blockchain roadmap is needed to strengthen intellectual property in the creative economy sector

adaptive regulations" and "Legal uncertainty" as critical issues. From a public policy perspective, this situation reflects

a "policy lag"—a delay in regulatory responses to technological advancements. Literature, such as (Lemineux, 2021), also

confirms that regulatory uncertainty acts as a major barrier to blockchain adoption in both the public sector and the digital economy.

Beyond regulation, another significant constraint is the lack of literacy and human resource capacity. NVivo identified "low blockchain literacy" and "human resource capabilities" as key factors hindering implementation. In the context of the digital economy, technological literacy is a fundamental prerequisite for adopting digital innovations. Research by the WEF indicates that a shortage of digital talent is a global challenge in blockchain technology development (World Economic Forum, 2020).

Another significant obstacle is the low level of user adoption, particularly among creative economy players. NVivo results show that "low user adoption" emerged as a key child theme. From a technical standpoint, the primary obstacles lie in the integration of legacy systems and low data interoperability. NVivo analysis regarding the theme of "Government Digital Governance Readiness" reveals that government systems remain siloed and lack optimal integration. From an e-government perspective, interoperability is a key factor in the successful implementation of digital technology (Harsh & Ichalkaranje, 2015). Without system integration, the widespread implementation of blockchain in public services is difficult to achieve.

Content analysis of policy documents also reveals a policy gap regarding blockchain regulation. Although various digital transformation policies exist, there are no regulations specifically governing blockchain, particularly concerning intellectual property management. This indicates that current policies remain general rather than operational, failing to serve as enablers for blockchain technology implementation.

International benchmarking shows that countries such as the United Kingdom and Singapore have overcome regulatory hurdles through the use of regulatory sandboxes, while Estonia has successfully addressed interoperability challenges via an integrated e-government system. These examples demonstrate that blockchain implementation barriers can be minimized through adaptive and innovative policy approaches (Lemineux, 2021; Tapscott & Tapscott, 2016).

Furthermore, data security and privacy issues pose

significant challenges to blockchain implementation. While blockchain is recognized as a secure technology, its application in the public sector necessitates the management of sensitive data. OECD literature emphasizes that security and data protection are critical factors in digital technology adoption, particularly within a governmental context (OECD, 2020).

Analysis of Strategies and Efforts in Policy Formulation

Analysis of policy documents reveals a critical "regulatory lag" and policy gap, as blockchain has not yet been explicitly integrated into the national digital governance architecture (Silva & Marques, 2021; Tan et al., 2022). From a public policy perspective, this misalignment necessitates an adaptive, innovative, and experimental policy framework to accommodate rapid technological progress (Kshetri, 2018; Rogers, 2003). Furthermore, international benchmarking highlights a significant "technology adoption gap," where user readiness fails to keep pace with the development of the innovation itself (Rogers, 2003). (see Table 7).

Conversely, NVivo results indicate that blockchain's core characteristics—transparency, immutability, traceability, and smart contracts—allow it to function effectively as a "trust infrastructure." In e-government frameworks, these decentralized attributes serve as key elements to establish a transparent, accountable, and secure government system. This structural capability significantly enhances public trust and reliability within digital governance environments, aligning seamlessly with foundational concepts established by (Swan, 2015) and (Kshetri, 2018).

International benchmarking demonstrates that effective blockchain policy relies on technological integration, adaptive regulation, and an innovation ecosystem. Estonia successfully incorporated blockchain into its digital infrastructure, while Singapore and the United Kingdom utilized regulatory sandboxes and fintech ecosystems. These global practices confirm that public sector implementation requires synergy between infrastructure readiness and flexible regulatory frameworks (OECD, 2020).

Conversely, NVivo analysis reveals that "Blockchain for the Creative Economy and Intellectual Property (IP)" is a primary focus. Informants highlighted proof of ownership, traceability, and smart contracts as dominant elements. This positions blockchain as a

Table 7. Policy Strategies and Instruments Based on Key Obstacles

Dimensions	Major Obstacles	Policy Strategy (Policy Solution)	Policy Instruments	International Benchmarks
Regulations & Policies	- Policy gap, - Legal uncertainty	Formulation of national blockchain regulations and legal recognition	- Regulatory sandbox - Blockchain-specific regulations - National standards for data and AI	UK (sandbox), Singapore (pro-innovation regulation)
Human Resources & Literacy	- Low technical capacity - Low literacy	Strengthening digital human resource capacity and blockchain talent	- Blockchain vocational program - Digital certification - Blockchain curriculum	South Korea (talent program), Estonia (digital literacy)
Technology & Infrastructure	- Low interoperability - Legacy systems	Development of an integrated digital architecture	- National digital architecture - API integration - Cloud & blockchain infra	Estonia (X-Road), China (BSN)
Adoption & Ecosystem	Low user adoption	Strengthening the innovation ecosystem and adoption incentives	- National pilot project - Startup incubation - Creative industry incentives	Singapore (Smart Nation), UK (innovation ecosystem)
Institutions & Governance	- Institutional fragmentation - Weak coordination	Strengthening collaboration-based governance model	- National blockchain task force - Quadruple helix collaboration - GovTech models	Estonia (integrated governance), OECD model

"trust infrastructure" that establishes decentralized trust systems without intermediaries (Tapscott & Tapscott, 2016).

However, Indonesian policy documents reflect a distinct "policy lag" (OECD, 2020), as blockchain is not yet explicitly integrated into the national IP framework. (see Table 8 and Table 9).

To bridge this gap, an evidence-based matrix is required to systematically link implementation challenges with

strategic interventions (Janssen et al., 2017). This strategy addresses two critical dimensions:

- a. Regulation and Policy: Overcoming policy gaps and legal uncertainty through national blockchain regulations, data

Table 8. Policy Strategies and Instruments Based on Key Obstacles with Regulatory and Governance Aspects

Dimension	Key Obstacle	Policy Strategy (Policy Solution)	Policy Instrument	International Benchmark	Regulatory and Governance Aspects
Regulations & Policies	- Policy gap - Legal uncertainty	Formulation of national blockchain regulations and legal recognition	- Regulatory sandbox - Blockchain-specific regulations - National standards for data and AI	UK (<i>sandbox</i>), Singapore (<i>pro-innovation regulation</i>)	Progressive fintech regulations and regulatory sandboxes support digital technology innovation.
Human Resources & Literacy	- Low technical capacity - Low literacy	Strengthening digital human resource capacity and blockchain talent	- Blockchain vocational program - Digital certification - Blockchain curriculum	Korea Selatan (<i>talent program</i>), Estonia (<i>digital literacy</i>)	National digital innovation policies and special blockchain zones, such as the Busan Blockchain Zone
Technology & Infrastructure	- Low interoperability - Legacy systems	Development of an integrated digital architecture	- National digital architecture - API integration - Cloud & blockchain infra	Estonia (X-Road), China (BSN)	Integrated digital regulations operate through an e-government ecosystem that supports data security and government system interoperability.
Adoption & Ecosystem	Low user adoption	Strengthening the innovation ecosystem and adoption incentives	- National pilot project - Startup incubation - Creative industry incentives	Singapore (<i>Smart Nation</i>), UK (<i>innovation ecosystem</i>)	Innovative regulation through "Smart Nation" policies and regulatory sandboxes for digital technology development
Institutions & Governance	- Institutional fragmentation - Weak coordination	Strengthening collaboration-based governance model	- National blockchain task force - Quadruple helix collaboration - GovTech models	Estonia (<i>integrated governance</i>), OECD model	Integrated digital regulations operate through an e-government ecosystem that supports data security and government system interoperability.

Table 9. Parent node and child node structure for the theme "Blockchain Potential or the Creative Economy & IP"

Codes	Aggregate number of coding references	Aggregate number of items coded
Nodes\Blockchain Potential for Creative Economy & IP	18	6
Nodes\Blockchain Potential for Creative Economy & IP\Tracking work usage (traceability)	3	2
Nodes\Blockchain Potential for Creative Economy & IP\Recording ownership of works (proof of ownership)	3	3
Nodes\Blockchain Potential for Creative Economy & IP\Automated royalty system based on smart contracts	7	4
Nodes\Blockchain Potential for Creative Economy & IP\Most prepared sub-sectors	5	5

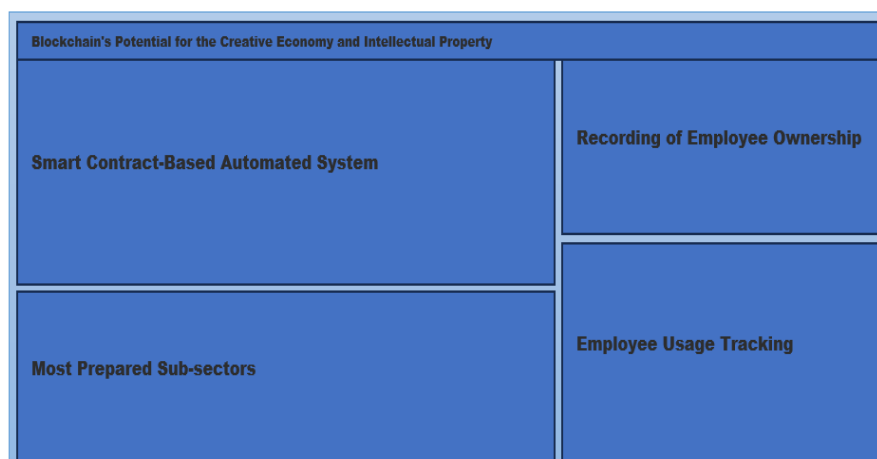


Figure 2. Visualization of the Hierarchy of Blockchain Potential for the Creative Economy and Intellectual Property.

standards, and regulatory sandboxes—as proven by the UK and Singapore (OECD, 2020).

- b. Human Resources and Digital Literacy: Addressing technical capacity shortages and low blockchain literacy through capacity building, digital certifications, and blockchain curricula (Perez et al., 2025). This aligns with successful digital talent cultivation models in South Korea and Estonia.

Regarding the technology and infrastructure dimension, the primary obstacles are weak system interoperability and legacy systems. Addressing this requires an integrated national digital architecture using APIs, cloud computing, and blockchain infrastructure, a strategy successfully demonstrated by Estonia's X-Road and China's Blockchain Service Network (BSN) (Department of Economic and Social Affairs, 2022). Furthermore, the adoption dimension reveals low user engagement, necessitating ecosystem support through pilot projects, incubation, and creative sector incentives. As supported by (Rogers, 2003) diffusion of innovations theory, user adoption depends heavily on ecosystem readiness and perceived benefits, as seen in the UK and Singapore.

Finally, the governance dimension faces institutional fragmentation. To counter this, a collaborative model incorporating a blockchain task force, a GovTech model, and a quadruple-helix framework is required (OECD, 2020). Implementing this successfully demands a holistic, phased strategy that spans short-, medium-, and long-term horizons, effectively uniting regulations, technology, and cross-sector collaborators (Janssen et al., 2020; Tapscott & Tapscott, 2016). NVivo analysis confirms that Indonesian institutions struggle with role fragmentation, highlighting a weak implementation of the "whole-of-government" approach (OECD, 2025). Within smart government frameworks, blockchain acts as a catalyst for trust-based public governance through transparency and data verification (Ølne et al., 2017; Tapscott & Tapscott, 2016). Ultimately, NVivo node mapping underscores blockchain's immense potential to resolve current property management deficits. By utilizing smart contracts for automated royalty distribution and providing robust digital proof of ownership, blockchain serves as the foundational infrastructure supporting an inclusive, integrated, and sustainable creative economy ecosystem.

The visualization reveals that blockchain implementation is perceived to hold significant potential for supporting a more transparent and efficient intellectual property management system. The technology is considered capable of strengthening digital mechanisms for recording work ownership, facilitating the tracking of work usage, and supporting automated royalty distribution systems via smart contracts. Furthermore, some informants highlighted that not all creative economy sub-sectors possess the same level of readiness to adopt blockchain technology; thus, it is necessary to identify the sub-sectors best positioned to pioneer its implementation. Consequently, the theme of "Blockchain Potential for the Creative Economy and IP" demonstrates that blockchain offers strategic opportunities to enhance transparency and the equitable distribution of economic benefits, as well as to strengthen intellectual property protection systems within the creative economy ecosystem. (see Figure 2).

Based on the Table 9, NVivo analysis of the child node "Smart contract-based automated royalty system," several informants emphasized that blockchain technology holds significant potential to support royalty distribution mechanisms that are more transparent, automated, and accountable. One informant noted that blockchain can address various challenges in intellectual property management—such as proving ownership from the moment of creation, transparently tracking usage, and enabling automated royalty distribution via smart contracts.

Furthermore, the technology allows for the digital registration of works using timestamping systems, thereby strengthening ownership records and simplifying the management of a work's economic rights.

Similar views were expressed by other informants, who assessed that blockchain implementation has great potential to support the development of automated royalty systems within the creative economy ecosystem. They highlighted that blockchain can be used to record time-stamped ownership, verify originality, and transparently track usage, leading to fairer and more efficient royalty distribution. Additionally, the integration of smart contracts into blockchain systems is seen as a way to ensure that royalty payments are executed automatically in accordance with agreed-upon licensing terms. These findings indicate that smart contract-based automated royalty systems represent a strategic application of blockchain technology for enhancing transparency and accountability in intellectual property management within the creative economy sector.

Based on the NVivo analysis of the "Most prepared sub-sectors" child node, several informants identified that not all creative economy sub-sectors possess the same level of readiness to adopt blockchain technology. The majority of informants assessed that sub-sectors with mature digital ecosystems are the most prepared to implement this technology. Frequently cited sub-sectors included music, film and video, digital content, gaming, graphic design, photography, and visual arts, as the processes of production, distribution, and consumption within these fields are already digitally based and linked to online platforms.

Furthermore, the need for recording work ownership, tracking intellectual property usage, and ensuring transparent royalty distribution was deemed greater in these sub-sectors. Some informants also noted that the potential for blockchain adoption is not limited to digitally based creative sub-sectors but could extend to local creative products—such as batik motifs and handicrafts—that require more robust systems for intellectual property protection and record-keeping.

Overall, enhancing institutional capacity within the framework of blockchain and smart government requires an integrated, ecosystem-based approach. Establishing a task force, fostering institutional integration, and developing blockchain-based governance are complementary strategies for building an effective digital governance system. The OECD emphasizes that a whole-of-government approach is key to digital transformation (OECD, 2020).

Supported by the GovTech model and policy feedback mechanisms, blockchain implementation can be carried out adaptively and sustainably. Literature such as (Tapscott & Tapscott, 2016) and (World Economic Forum, 2020) indicates that the integration of technology, policy, and institutions is a primary factor in creating a trust-based smart government system.

Conclusion

This study indicates that while digital transformation in the creative economy has advanced, current efforts focus heavily on distribution rather than protecting and monetizing intellectual property (IP). Government digital governance faces structural challenges, including system fragmentation, low data interoperability, and lack of inter-agency standardization, which hinder national-scale blockchain implementation. The empirical findings yield three main conclusions:

1. Dynamics of Blockchain in Smart Government: Blockchain adoption is in its early stages and not yet integrated into IP governance. Bridging the gap between technological potential and actual implementation requires targeted policies and a clear, systematic roadmap.

2. Challenges and Enabling Factors: Implementation faces regulatory obstacles, infrastructure deficits, limited human resource capacity, and low digital literacy. Conversely, the demand for transparency and cross-sector collaboration serves as an enabler. Overcoming these barriers requires an adaptive policy model and targeted regulatory strengthening.
3. Integrated Policy Strategies: Sustainable implementation must rest on three pillars: establishing policy frameworks that treat blockchain as "trust infrastructure," optimizing blockchain for IP commercialization, and enhancing

institutional capacity through cross-sector coordination.

Overall, successful blockchain adoption in the creative economy requires an integrated, adaptive approach driven by policy consistency and multi-stakeholder synergy. Because structural and regulatory barriers persist, the government must provide actionable policy direction. This study recommends collaborative, multidimensional measures among academics, practitioners, creators, and relevant ministries to build a secure digital ecosystem that protects intellectual property and drives national creative economic growth.

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