

Reconstruction of the Legal Framework for Consumer Protection in ESG-Based Digital Investment and Blockchain Technology: A Legal Study

Muchammad Shidqon Prabowo¹ ✉ , Dewi Sulistianingsih² ,
 Nasarudin Abdul Rahman³ , Takwim Azami¹ 

¹ Faculty of Law, Universitas Wahid Hasyim, Semarang, Indonesia

² Faculty of Law, Universitas Negeri Semarang, Semarang, Indonesia

³ International Islamic University Malaysia, Selangor, Malaysia

✉ Corresponding email: shidqonprabowo@unwahas.ac.id

Abstract

This study analyzes the regulatory framework for consumer protection in digital investment based on ESG principles and blockchain technology in Indonesia. The method used is juridical-normative with a statutory, conceptual, and comparative approach. The results of the study indicate a significant regulatory gap, including the non-recognition of the legality of smart contracts, the absence of a digital ESG claim verification mechanism, the absence of a blockchain-based dispute resolution model, and the fragmentation of supervision coordination between national authorities. As a contribution, this study offers a new legal framework model that integrates the recognition of smart contracts, the establishment of a digital ESG verification institution, the development of blockchain-based ADR, and regulatory harmonization. This innovation is expected to strengthen consumer protection in the sustainable investment ecosystem based on blockchain technology. In practice, this study

recommends the formulation of the Digital and ESG Consumer Protection Law, the establishment of an independent ESG verification institution, and strengthening regulatory coordination in Indonesia. The novelty of this article is its focus on three areas of analysis: ESG, blockchain, and consumer protection. All three are analyzed from a legal perspective. The limitation of this study is the absence of empirical data; future research is recommended to use a quantitative or mix-method approach to evaluate consumer behavior in the ESG blockchain platform.

KEYWORDS *Blockchain, ESG Investment, Consumer Protection, Smart Contract, Alternative Dispute Resolution*

Introduction

In the last decade, digital transformation and global commitment to sustainability have driven the integration of blockchain technology into Environmental, Social, and Governance (ESG)-based investment practices¹. Businesses must engage with sustainability and transparency because ESG factors will influence consumer and investment decisions. Blockchain technology is an ideal ally in this journey due to its trustworthiness and transparency. Businesses are empowered by ESG solutions (Blockchain Web Services) to thrive in a sustainable society and comply with ESG reporting regulations. The integration of blockchain technology into sustainability reporting is a revolutionary step in aligning corporate operations with international sustainability goals. Businesses that use this technology will not only improve their reporting procedures but also help create a more sustainable and transparent global economy.

This technology is considered capable of increasing the transparency of ESG reporting, strengthening accountability, and mitigating the risk of

¹ The United Nations Environment Programme, “Blockchain Technology and Environmental Sustainability,” The United Nations Environment Programme (UNEP), 2020, <https://www.unep.org/resources/emerging-issues/blockchain-technology-and-environmental-sustainability>

greenwashing through automated audit trails and real-time verification². Report³ emphasizes the importance of blockchain in accelerating the adoption of global sustainability principles through more transparent green finance. However, this development also presents new legal challenges related to digital consumer protection, especially in cross-jurisdictional transactions and smart contracts that run automatically without human supervision⁴. In this context, the existence of an adaptive regulatory framework is important to maintain a balance between technological innovation and consumer rights protection.

Environmental Social Governance or ESG is a standard or guideline used by companies in implementing sustainable development. The function of ESG is to measure the impact or become a parameter in the development conducted by the company. The ESG established by the Indonesian Government are: (1) Pollution prevention and waste management; (2) Biodiversity conservation; (3) Natural resource management and energy efficiency; (4) Climate change mitigation, adaptation, and disaster risk; (5) Employment and work environment; (6) Diversity, equality, inclusivity, and access; (7) Social interest; (8) Cultural heritage; (9) Leadership and governance; (10) Risk and control⁵.

In Indonesia, the development of ESG-based investments and the use of blockchain technology are starting to receive attention, as seen from the launch of the Green Taxonomy by the Financial Services Authority⁶. and the initiative to establish a digital carbon exchange (IDXCarbon). However, domestic legal

² World Economic Forum, "Blockchain for Scaling Climate Action," 2023, https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www3.weforum.org/docs/WEF_Blockchain_for_Scaling_Climate_Action_2023.pdf&ved=2ahUKEwj2aHQRbqUAxUT2DgGHY7oEP4QFnoECBcQAQ&usq=AOvVaw0WPQrPfwH_Eetx8v6ZEO.

³ World Economic Forum, "ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance," 2023, <https://www.weforum.org/whitepapers/esg-disclosure-and-blockchain-enhancing-transparency-in-green-finance>.

⁴ Organisation for Economic Co-operation and Development, "Blockchain and Consumer Protection: Exploring Global Regulatory Approaches. Organization for Economic Co-Operation and Development," OECD, 2023, <https://www.oecd.org/digital/blockchain-and-consumer-protection.htm>.

⁵ Krisna Sanarta, "Mengenal ESG Dan Manfaatnya Bagi Perusahaan," *Hukumonline.Com*, July 2023, <https://rcs.hukumonline.com/insights/esg>.

⁶ Anto Prabowo, "Siaran Pers: Presiden Dorong Sinergi Perkuat Pemulihan Ekonomi, Peluncuran Taksonomi Hijau Indonesia," Deputy Komisioner Hubungan Masyarakat dan Logistik OJK, 2022, <https://ojk.go.id/id/berita-dan-kegiatan/siaran-pers/Pages/Presiden-Dorong-Sinergi-Perkuat-Pemulihan-Ekonomi.aspx>.

instruments such as the Consumer Protection Law and the ITE Law have not yet accommodated the protection of consumer rights in the blockchain-based digital transaction ecosystem. Data from *Antara* noted that the number of digital asset investors in Indonesia has reached more than eighteen million⁷, but specific regulations to protect consumers from the risk of smart contract failure, ESG token greenwashing, and blockchain platform manipulation are still lacking. The real gap between the potential of the digital green economy and the lack of an adaptive legal framework is a serious challenge in realizing sustainability-based consumer protection.

Existing literature focuses on the economic and technical benefits of blockchain integration for green projects, such as increased transparency and efficiency in ESG reporting⁸ 9. However, the legal aspects of consumer protection, especially in the context of technology-based ESG investments in developing countries, still receive less attention. A study by Jewel Kumar¹⁰ shows that despite the increasing adoption of financial technology, there are gaps in digital consumer protection, especially related to the lack of uniform ESG standards.

There are 12 principles in the European Law Institute (ELI), namely: (1) The principle of purpose and scope; (2) The principle of types of smart contracts; (3) The principle of case-specific approaches; (4) The principle of private international law; (5) The principle of the legal nature of transactions on the blockchain; (6) The principle of the effectiveness of declarations of will on

⁷ Ade Irma Junida, "Bappebti: Jumlah Pelanggan Aset Kripto Terdaftar Capai 18,25 Juta," *Antara: Kantor Berita Indonesia*, December 16, 2023, <https://www.antaranews.com/berita/3874497/bappebti-jumlah-pelanggan-aset-kripto-terdaftar-capai-1825-juta>.

⁸ Guo Yanjun, "Application of Blockchain Technology in Green Finance and Evaluation of Its Economic Effects," *Journal of Posthumanism* 5, no. 5 (2025): 2239–64, <https://doi.org/https://doi.org/10.63332/joph.v5i5.1613>.

⁹ Mosab I. Tabash Mohammad Rashed Hasan Polas, Ahmed Imran Kabir, Abu Saleh Md. Sohel-Uz-Zaman, Ridoan Karim, "Blockchain Technology as a Game Changer for Green Innovation: Green Entrepreneurship as a Roadmap to Green Economic Sustainability in Peru," *Journal of Open Innovation: Technology, Market, and Complexity* 8, no. 2 (2022), <https://doi.org/https://doi.org/10.3390/joitmc8020062>.

¹⁰ Jewel Kumar Roy and László Vasa, "Financial Technology and Environmental, Social and Governance in Sustainable Finance: A Bibliometric and Thematic Content Analysis," *Discover Sustainability* 6, no. 1 (2025): 148, <https://doi.org/10.1007/s43621-025-00934-2>.

the blockchain; (7) The principle of formal and substantive validity; (8) The principle of language; (9) The principle of off-chain superiority over on-chain; (10) The principle of reversal with reverse transactions; (11) The principle of on-chain dispute resolution agreements; (12) The principle of the weaker party.

In addition, the principles developed by the European Law Institute emphasize that consumer protection must remain in place and govern transactions encoded through smart contracts¹¹. In this context, modern consumer protection theory demands a shift from conventional product-based protection to digital platform-based protection and automated transactions^{12 13}.

Based on the study, the main hypothesis proposed in this study is that the legal framework for consumer protection in Indonesia has not been able to anticipate the complexity and risks of blockchain-based ESG investments, so that legal reconstruction is needed based on the principles of sustainability, technological transparency, and legal justice.

In recent years, the integration of blockchain technology into Environmental, Social, and Governance (ESG)-based investment practices has attracted the attention of many researchers. Research shows that blockchain can increase the transparency of ESG reporting, improve accountability, and accelerate the adoption of sustainability principles in the financial sector¹⁴. Research identifies the potential for ESG tokenization through blockchain, but also warns of ethical and legal challenges, especially regarding the validity of smart contracts and legal liability in automated transactions¹⁵.

¹¹ The European Law Institute, *ELI Principles on Blockchain Technology, Smart Contracts and Consumer Protection* (Vienna, Austria: European Law Institute, 2023), https://www.europeanlawinstitute.eu/fileadmin/user_upload/p_eli/Publications/ELI_Principles_on_Blockchain_Technology_Smart_Contracts_and_Consumer_Protection.

¹² Geraint G. Howells & Stephen Weatherill, *Consumer Protection Law* (Aldershot: Ashgate Publishing, 2005).

¹³ Development, "Blockchain and Consumer Protection: Exploring Global Regulatory Approaches. Organization for Economic Co-Operation and Development."

¹⁴ Mohan Bhandari, Ghanashyam Tiwari, and Maheshwor Dhakal, "Enhancing Transparency and Accountability in Sustainable Finance Through Blockchain Technology: A Systematic Review of the Literature," *Journal of Intelligent Management Decision* 4, no. 1 (2025): 23–43, <https://doi.org/Journal of Intelligent Management Decision>.

¹⁵ Neri Aslina & Anis Noviyya, "Legal Responsibility in Smart Contracts in Blockchain Transactions," *IPSO JURE* 3, no. 1 (2026): 57–73, <https://doi.org/https://doi.org/10.62872/d8kn5x96>.

Smart contract innovation and tokenization are the perfect solutions for payment transactions. With blockchain-based smart contracts and tokenization, we do not need to worry about data leaks, theft, or digital data manipulation due to the extremely elevated level of data security¹⁶. However, it notes the heterogeneity of consumer protection in digital ESG-based investments, especially in developing countries¹⁷. In Indonesia, regulations such as Law Number 11 of 2008 concerning Electronic Information and Transactions (UU ITE) has regulated aspects of electronic transactions but has not provided specific protection for consumers in the blockchain ecosystem. This indicates a legal gap that needs to be bridged immediately through the reconstruction of the national legal framework. This study offers an integrative approach between consumer protection, ESG principles, and the characteristics of blockchain technology, which is an approach that has not been widely discussed in previous literature, especially in the context of Indonesian law. This innovative approach includes the formulation of a legal framework model that combines legal recognition of smart contracts, digital ESG verification certification, and the development of blockchain-based online dispute resolution mechanisms^{18 19}. With a focus on Indonesia as a developing country that is in a digital transition period, this study provides a practical contribution to the formation of digital consumer protection policies. (See Figure 1).

¹⁶ I Ketut Gunawan et al., "Smart Contract Innovation and Blockchain-Based Tokenization in Higher Education," *Journal of Education Technology* 5, no. 4 (2021): 636–44, <https://doi.org/https://doi.org/10.23887/jet.v5i4.40665>.

¹⁷ Roy and Vasa, "Financial Technology and Environmental, Social and Governance in Sustainable Finance: A Bibliometric and Thematic Content Analysis."

¹⁸ Programme, "Blockchain Technology and Environmental Sustainability."

¹⁹ World Economic Forum, "ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance," 2022, <https://www.weforum.org/whitepapers/esg-disclosure-and-blockchain-enhancing-transparency-in-green-finance>.

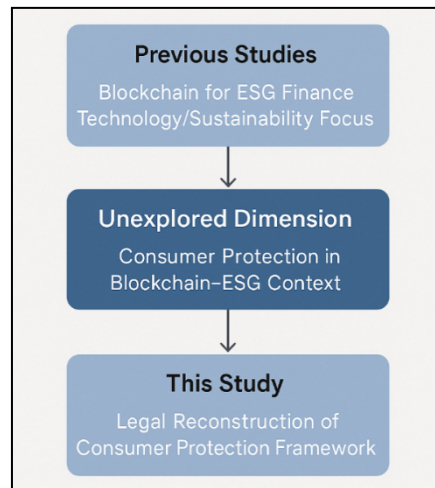


Figure 1. Gap Analysis Map in Literature on Blockchain-ESG and Consumer Protection

Source: Author, 2024 (edited)

The objectives of this study are; 1) To analysed the applicable regulations related to consumer protection in digital investment based on ESG and blockchain technology in Indonesia; 2) To identify weaknesses and legal gaps in the digital consumer protection framework; 3) To formulate new legal principles that are adaptive to technological innovation and sustainability principles; 4) To develop a reconstructive legal framework model to protect consumers in digital ESG investment; and 5) To provide concrete recommendations for strengthening national policies in blockchain-based sustainable financial transformation.

In The research uses a juridical-normative legal method with a descriptive-analytical approach. The focus of the research is to analyse the applicable positive legal norms and formulate a reconstruction of the legal framework in the context of digital investment based on the principles of Environmental, Social, and Governance (ESG) and blockchain technology. Three approaches used in this study are the statute approach to examine relevant regulations on consumer protection, digital investment, and blockchain technology regulations. The conceptual approach to examine the legal theory underlying the principles of consumer protection and sustainability (ESG), as well as the legal construction of blockchain technology, and the comparative

approach to compare the Indonesian legal framework with other jurisdictions, such as the European Union through the *Markets in Crypto-Assets (MiCA) regulation* and Singapore through *the Payment Services Act*, in order to obtain best practices that can be adapted.

The data sources or legal materials used in this study consist of primary, secondary, and tertiary legal materials. Primary legal materials include Law Number 8 of 1999 concerning Consumer Protection, Law Number 11 of 2008 concerning Electronic Information and Transactions (ITE) and its amendments, Financial Services Authority Regulation (POJK) No. 51/POJK.03/2017 concerning Sustainable Finance, and Bappebti Regulation No. 11 of 2022 concerning Crypto Assets. Secondary legal materials include Scopus-indexed scientific articles that discuss current issues related to blockchain, ESG, and digital consumer protection, as well as reports from international institutions such as the United Nations Environment Programme (UNEP), the World Economic Forum, and the Organisation for Economic Co-operation and Development (OECD). Tertiary legal materials include legal dictionaries, technology law encyclopaedias, and digital regulatory directories as a complement to the analysis.

The data collection technique used in this study is a documentation study conducted through a review of laws, regulations, government policies, white papers from the blockchain-ESG industry, and international academic reports. This study also reviews the latest scientific literature from journals indexed by Scopus to obtain a picture of *the state of the art* in the field being studied. The data analysis techniques used include normative-prescriptive analysis to evaluate the suitability of existing regulations with the dynamics of ESG and blockchain-based digital investment; *legal gap analysis* to identify weaknesses, inconsistencies, and legal gaps in digital consumer protection; and a legal reconstruction approach to formulate new legal principles and alternative legal framework models that can strengthen the consumer protection system in a digital ecosystem based on sustainability and technology.

The research procedure consists of seven stages, namely: identification of problems related to legal risks in digital ESG investment; data collection from

regulations and literature; analysis of existing regulations; identification of legal gaps; comparative study of jurisdictions; preparation of a legal reconstruction model; and formulation of policy recommendations for national policy makers, which can be seen briefly in Figure 2.

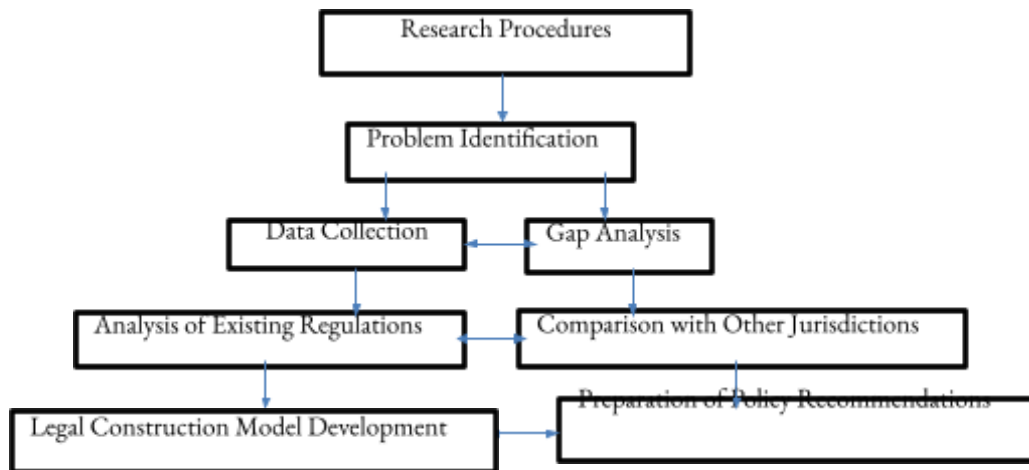


Figure 2. Research Procedure
Source: Primary Data (2024)

This study uses a step-by-step analysis, namely: (1) identification and analysis of regulations related to ESG-Smart Contract-Consumer Protection; (2) Conducting comparisons with other countries; (3) Conducting legal construction for the link between ESG-Smart Contract-Consumer Protection. This study uses a comparison of regulations in the European Union with MICA and Singapore with PSA. This is based on both legal instruments (MICA and PSA) as global and regional benchmarks for integrating ESG into consumer protection. The validity of this study is conducted methodologically with normative legal research.

Analysis of Existing Regulation on Consumer Protection in ESG and Blockchain-Based Digital Investments in Indonesia

This paper focuses on three concepts related to the analysis of existing consumer protection regulations in ESG and blockchain-based digital investment in Indonesia.

First, the concept of consumer protection theory in the digital age. The theory of consumer protection was originally based on the right to security, the right to information, the right to choose, and the right to be heard²⁰. In Indonesia, these principles are reflected in Law Number 8 of 1999 concerning Consumer Protection (Consumer Protection Law), which stipulates the basic rights of consumers and the obligations of business actors. However, with the development of digital-based transactions and smart contract automation, new legal risks have emerged, which have not been fully accommodated in the law. The OECD²¹ emphasizes the importance of adapting consumer law to blockchain technology to avoid consumer losses due to system failures or non-transparent information.

Second, regarding the concept of ESG principles in a digital investment perspective. Environmental, Social, and Governance (ESG) is a framework that guides investment towards global sustainability²². In Indonesia, the commitment to sustainable finance is emphasized through OJK Regulation Number 51/POJK.03/2017 concerning the Implementation of Sustainable Finance. This regulation requires financial services institutions to integrate ESG principles into their business activities. However, the implementation of ESG principles in blockchain-based investment platforms poses new challenges, especially in digital verification of sustainability claims²³, which risks giving rise to digital greenwashing.

Third, regarding the concept of blockchain and its legal implications in consumer protection. Blockchain can drive transparent, fair, and resilient system change, provided that technical choices, regulatory frameworks, and stakeholder collaboration evolve harmoniously²⁴. Blockchain offers the advantages of transparency, immutability, and decentralization in digital

²⁰ Weatherill, *Consumer Protection Law*.

²¹ Development, "Blockchain and Consumer Protection: Exploring Global Regulatory Approaches. Organization for Economic Co-Operation and Development."

²² Programme, "Blockchain Technology and Environmental Sustainability."

²³ Forum, "ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance," 2022.

²⁴ Marsela Thanasi-Boçe and Julian Hoxha, "Blockchain for Sustainable Development: A Systematic Review," *Sustainability* 17, no. 11 (2025): 4848, <https://doi.org/https://doi.org/10.3390/su17114848>.

transactions²⁵. However, in Indonesia, the legal aspects of the use of blockchain technology are only limited through Bappebti Regulation Number 11 of 2022 concerning the Determination of the List of Crypto Assets that Can Be Traded in the Physical Crypto Asset Market. This regulation focuses more on trading crypto assets as commodities, rather than protecting consumers who transact using blockchain technology for ESG investments. The absence of a legal verification mechanism for smart contracts and ESG tokenization increases legal risks for digital consumers.

The relationship between consumers and companies (business actors) in the blockchain, ESG, and smart contract space is not conventional, but rather digital. This relationship is not direct interaction but rather based on digital code. In this digital space, consumers can also become investors, because consumers are not just providers of goods/services but also holders of ESG tokens, blockchain users—they can be considered digital investors.

Identify weaknesses and Legal Gaps

To analyze the legal gap in consumer legal protection regulations, at least four regulations will be presented:

1. Law No. 8 of 1999 concerning Consumer Protection

Law Number 8 of 1999 concerning Consumer Protection (Consumer Protection Law) is the main legal basis for guaranteeing consumer rights in Indonesia. One of the key provisions is stated in Article 4, which contains the principles of consumer protection, including the right to comfort, security, and safety in consuming goods and/or services (Article 4 letter a); the right to choose and obtain goods and/or services in accordance with the exchange rate and conditions promised (Article 4 letter b); and the right to correct, clear, and honest information regarding the condition and guarantee of goods and/or services (Article 4 letter c). These principles reflect consumer protection in the context of conventional transactions.

²⁵ Meysam Moheby & Omid Fatahi Valilai, “Examining the Role of Blockchain in Enhancing Transparency and Traceability in Sustainable Supply Chains” (Bremen, Germany, 2026), <https://doi.org/https://doi.org/10.31224/6270>.

However, although this principle protects consumers, there are currently no specific regulations in Indonesian legislation, including the ITE Law, regarding blockchain technology-based transaction mechanisms and the use of smart contracts. Likewise, there are no specific provisions governing legal protection for tokenized digital asset transactions, including ESG (*Environmental, Social, and Governance*)-based tokens. In addition, there is no legally valid digital verification mechanism to assess a project's sustainability claims, which can prevent greenwashing practices. The ITE Law still assumes a conventional relationship between business actors and consumers that is direct and personal and has not accommodated the automatic digital interaction model (*trustless system*) which is the main characteristic of the modern blockchain ecosystem. Therefore, regulatory updates or the formulation of new norms is needed that can adapt to the legal realities in the digital economy and decentralized technology.

2. Law No. 11 of 2008 concerning Electronic Information and Transactions (UU ITE) in conjunction with Law No. 19 of 2016

Law Number 11 of 2008 concerning Electronic Information and Transactions (UU ITE), which has been updated through Law Number 19 of 2016, provides a legal basis for the recognition and implementation of electronic transactions in Indonesia. One of the important provisions in this law is contained in Article 5 paragraph (1), which states that electronic documents are valid legal evidence. In addition, Article 9 stipulates that business actors who offer products through electronic systems must provide complete and correct information relating to the terms of the contract, the manufacturer and the products offered. Although the Law on Electronic Information and Transactions (UU ITE) has recognized the legal validity of digital transactions in general, this regulation has not explicitly regulated new aspects in the development of digital technology, especially related to the use of smart contracts. The ITE Law does not include a definition, scope, or legal liability mechanism in the event of failure to execute automatically from a smart contract. In addition, the ITE Law also does not provide specific protection for consumers involved in digital transactions based on ESG (Environmental,

Social, and Governance) project tokenization, so there is no clear legal compensation mechanism in cases of losses or fraud that may occur in the ecosystem. This indicates a regulatory gap that needs to be addressed through revision or expansion of legal norms to accommodate new risks in the modern digital transaction ecosystem.

3. Financial Services Authority Regulation (POJK) No. 51/POJK.03/2017 concerning the Implementation of Sustainable Finance

POJK No. 51/POJK.03/2017 is a regulation that stipulates that financial services institutions in Indonesia are required to implement sustainable finance principles that include the integration of environmental, social, and governance (ESG) aspects in their business activities. This regulation encourages financial industry players to prepare action plans and periodic sustainability reports to create a financial system that is responsible for social and environmental impacts. This POJK only regulates the obligations of financial institutions, but does not directly regulate consumer protection for blockchain-based ESG projects. Currently, there is no standardized digital verification mechanism or independent audit for technology-based sustainability (ESG) claims, thus potentially opening space for greenwashing. In addition, the Financial Services Authority Regulation (for example, POJK No. 51/POJK.03/2017 concerning the Implementation of Sustainable Finance) has not explicitly regulated consumer rights to access sustainability information in the context of digital platform-based services. As a result, consumers do not have adequate guarantees of ESG information disclosure when interacting with digital financial products that claim to be sustainable. Thus, although this regulation encourages sustainability in principle, consumer legal protection for digital sustainability practices is still implicit and requires further regulatory strengthening.

4. Bappebti Regulation No. 11 of 2022 concerning Determination of Crypto Asset List

Bappebti Regulation No. 11 of 2022 regulates the list of crypto assets that can be legally traded in Indonesia, as well as establishing a mechanism for registration, risk assessment, and supervision of these digital assets. This regulation provides an initial basis for the legitimacy of crypto asset trading and

creates legal certainty for digital asset industry players. However, the focus of this regulation is still limited to the legality and governance aspects of trading, and has not comprehensively regulated consumer protection, especially in terms of information transparency, risk mitigation, and dispute resolution mechanisms. In addition, there are no detailed provisions regarding the failure of smart contract execution, the risks inherent in the tokenization of ESG-based projects, and the form of legal responsibility if consumers suffer losses due to inaccurate or misleading information. On the other hand, although the list of tokens that are allowed to be traded is selectively determined, there is no continuous monitoring system for the performance and transparency of the projects behind the tokens, including ESG-based tokens. Therefore, this regulation also still leaves legal gaps in terms of consumer protection in the physical crypto asset market, especially those related to digital innovation and sustainability.

Table 1 below presents a brief analysis of a number of relevant national regulations in the context of consumer protection, digital transactions, and ESG-based investments using blockchain technology. Each regulation is analyzed based on its scope or legal substance, the normative gaps or deficiencies (legal gaps) found, and recommendations for legal reconstruction to address these weaknesses.

TABLE 1. Results of Regulation Analysis, Legal Gaps and Reconstruction Recommendations

Regulation	Scope/Substance	Legal Gap	Reconstruction Recommendations
Law No. 8 of 1999 on Consumer Protection	Conventional consumer rights: safety, information, choice, and compensation.	Does not regulate blockchain-based automated transactions or tokenized ESG investments.	Revise the law or enact a Digital Consumer Protection and ESG Law recognizing smart contracts and digital tokens.

Law No. 11 of 2008 on Electronic Information and Transactions (as amended by Law No. 19 of 2016)	Validity of electronic documents and obligations of electronic system operators.	No provisions on liability for smart-contract failures or ESG token validation.	Add provisions on smart contracts, blockchain-based ESG validation, and digital dispute resolution.
POJK No. 51/POJK.03/2017 on Sustainable Finance	Integration of ESG principles into the financial services sector.	Does not regulate consumer protection for ESG claims on blockchain platforms.	Require ESG certification platforms and independent blockchain-based verification.
Bappebti Regulation No. 11 of 2022 on Crypto Assets	Regulates crypto-asset trading as commodities.	No liability framework for failed ESG token transactions and inadequate consumer protection.	Expand Bappebti's mandate or strengthen coordination with OJK and Kominfo.

Source: Authors, 2024 (edited)

Identifying weaknesses and legal gaps in consumer protection for ESG-based digital investments and blockchain technology is important to assess regulatory readiness in Indonesia. Although there are several relevant regulations, such as the Electronic Information and Transactions Law (UU ITE) and the OJK Regulation on sustainable finance, these regulations have not fully accommodated the specific characteristics of modern digital transactions. One of the fundamental issues is the legal validity of smart contracts, which to date has not been explicitly regulated. The ITE Law does recognize electronic documents as valid evidence (Article 5) but does not mention or regulate smart contracts as a form of digital agreement that is automatically executed. As

highlighted by Silitonga²⁶ and Kuspraningrum²⁷, the absence of regulations on smart contracts creates legal uncertainty regarding the validity of agreements and the allocation of responsibility in the event of a system failure. In practice, this has the potential to harm consumers who are affected by code defects (bugs) or system malfunctions without a clear compensation mechanism. In comparison, the European Union through the MiCA Regulation has begun to recognize the existence of smart contracts and establish a legal framework for consumer protection in the context of blockchain-based digital transactions.

To date, digital verification of sustainability claims (ESG) has not had a strong legal basis in Indonesia. Although POJK No. 51/POJK.03/2017 regulates sustainability reporting obligations for financial services institutions, the regulation does not include a verification mechanism for ESG tokens based on blockchain technology. The absence of an authoritative institution or mechanism tasked with independently verifying digital ESG claims has the potential to open space for digital greenwashing, namely the delivery of inaccurate or misleading sustainability information without adequate validation. This can not only harm consumers but also reduce public trust in ESG-based digital platforms. This is also reinforced by the statement from the Managing Partner of UMBRA Strategic Legal Solutions, Pramudya Oktavinanda, who stated that "If we look at Indonesia, legally there is not a single regulation that specifically regulates or confirms ESG. However, ESG principles have been adopted and spread in various existing laws and regulations". Global practices, as highlighted by the World Economic Forum, emphasize the importance of implementing a digital verification system to prevent manipulation and greenwashing in sustainability information. In Indonesia, there is no digital dispute resolution mechanism specifically designed to manage conflicts arising from blockchain-based transactions and smart

²⁶ Si Ngurah Ardhya Hendri Silitonga, Ratna Artha Windari Dewarto, "Analisis Keabsahan (Smart Contract) Transaksi Aset Digital Di Platform Ethereum Dalam Teknologi Blockchain," *Jurnal Komunitas Yustisia* 7, no. 1 (2024), <https://ejournal.undiksha.ac.id/index.php/jatayu/article/view/94160>.

²⁷ Emilda Kuspraningrum, "Keabsahan Kontrak Elektronik Dalam UU ITE Ditinjau Dari Pasal 1320 KUHPerdata Dan UNCITRAL Model Law On Electronic Commerce (The Legality of Electronic Contract in the Enactment of Information and Electronical Transaction Derived from Article 1320 Civil)," *Risalah Hukum* 7, no. 2 (2011), <https://ejournal.fh.unmul.ac.id/risalah/article/view/189/104>.

contracts. Law No. 8 of 1999 concerning Consumer Protection, especially Article 45, only regulates conventional dispute resolution through the Consumer Dispute Resolution Agency (BPSK), without covering digital transaction models that are automatic, cross-jurisdictional, and anonymous such as in ESG smart contracts. In comparison, Singapore has developed the *SIAC Digital Dispute Resolution Rules*, which provides a modern dispute resolution framework for transactions involving blockchain technology, artificial intelligence, and autonomous digital systems. As a result, consumers do not have access to fast and adaptive dispute resolution to the characteristics of digital technology, making it difficult for consumers to obtain justice in ESG smart contract disputes.

Not only that, but there is also a problem in coordination between regulatory institutions, where regulatory responsibilities are spread between OJK (for the sustainable finance sector), Bappebti (for crypto assets as commodities), and Kominfo (for electronic transactions and data protection). The absence of nationally integrated regulatory coordination to unify this coordination has resulted in a vacuum of legal protection for consumers in the ESG blockchain ecosystem where consumers can be harmed without complete regulatory protection. In fact, the model in the European Union through *the Digital Finance Package* encourages a cross-agency approach to oversee the digital financial ecosystem. These weaknesses show that the legal system in Indonesia is not normatively or institutionally ready to provide adequate protection in the ESG-based digital investment ecosystem. Therefore, a legal reconstruction is needed that is adaptive, integrative, and oriented towards consumer protection to secure blockchain-based ESG investment transactions through; 1) Preparation of a digital and ESG Consumer Protection Law that contains the validity of smart contracts, consumer rights, and ESG token verification standards; 2) Establishment of a blockchain ESG verification institution; 3) Development of digital blockchain ADR and 4) Harmonization of OJK-Bappebti-Kominfo regulations for integrated supervision.

The provisions in MiCA (European Union) and PSA (Singapore) offer a very advanced regulatory model, transplanting the law into the Indonesian legal

system cannot be done directly, the following things must be considered: (1) Institutional structures that must be adjusted; (2) Public education; (3) Human resources that support law enforcement. The challenges facing Indonesia in the future are to make gradual and sustainable changes, provide education to the public, and strengthen law enforcement.

Model for Reconstruction of the Legal Framework for Consumer Protection

Consumer protection construction model emphasizes the balance of positions for businesses and consumers. When consumers are in a weak position, the law can provide the strongest and most effective protection.

1. Legality of Smart Contracts

Smart contracts are automated programs based on blockchain technology that execute transaction provisions without requiring human intervention. In current Indonesian law, Article 5 of the Electronic Information and Transactions Law (UU ITE) has recognized electronic documents as valid legal evidence. Although smart contracts have been widely used in various digital transactions, until now there has been no explicit recognition in the Indonesian legal system that smart contracts that are executed automatically can be considered a valid agreement as referred to in Article 1320 of the Civil Code (KUHPerduta)²⁸. In fact, contracts are the basis of legal relations between the parties. If a smart contract fails in its automatic execution or contains code defects, consumers can suffer losses without having an adequate legal basis to file a claim for compensation. Based on the principles of the European Law Institute (ELI)²⁹, smart contracts should be recognized as part of contractual law with an emphasis on clarity of the responsibilities of the parties involved,

²⁸ Korintus Wilson Horas Hutapea & Adi Sulistiyono, "Keabsahan Smart Contract Dengan Teknologi Blockchain Menurut Kitab Undang-Undang Hukum Perdata Dintandai Dengan Teknologi Berbasis Digital Yang Terus Mengalami Kemajuan Pesat . Perubahan Ini Munculnya Mata Uang Kripto . Ini Pada Dasarnya Adalah Program Ko," *Aliansi: Jurnal Hukum, Pendidikan Dan Sosial Humaniora* 1, no. 3 (2024): 86–94, <https://doi.org/https://doi.org/10.62383/aliansi.v1i3.177>.

²⁹ Institute, *ELI Principles on Blockchain Technology, Smart Contracts and Consumer Protection*.

protection against automatic failure of execution, and the consumer's right to compensation. Therefore, legal reconstruction is needed so that smart contracts are explicitly recognized as a valid form of legal contract.

The draft clauses that should be included in a smart contract are Clauses relating to the clause that this article is a valid and binding agreement for the parties. Although the smart contract is in digital form, it has the same strength and validity as a conventional contract. There needs to be a clause that emphasizes the textual matters in the smart contract that cause losses to consumers, there must be accountability from the organizer.

2. Digital ESG Verification Certification

Tokenization of projects based on environmental, social, and governance (ESG) principles through blockchain technology opens opportunities for *greenwashing practices*, namely the recognition of projects as sustainable without adequate objective evidence. In Indonesia, POJK No. 51/POJK.03/2017 has regulated sustainability reporting (ESG) in the conventional financial services sector but does not yet include a blockchain-based verification mechanism for digital ESG projects or tokenization of sustainable assets. The absence of an independent verification mechanism for technology-based ESG claims has the potential to open space for digital greenwashing practices, where consumers can be tricked into purchasing ESG tokens or other digital assets that are not supported by valid sustainability activities. The World Economic Forum³⁰ has highlighted the potential of blockchain to create transparent and verifiable ESG reporting, while EU regulations such as *the Sustainable Finance Disclosure Regulation* (SFDR) have demanded full transparency and audit standards in sustainability claims. Therefore, it is recommended that a Digital ESG Verification Body be established to verify the sustainability claims of blockchain projects, provide public certification of digital ESG projects that meet the standards, and protect consumers from greenwashing practices.

The regulations in the POJK need to accommodate that every ESG-related service must obtain ESG certification from the OJK or from an institution accredited to provide ESG certification.

³⁰ Forum, "ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance," 2023.

3. Alternative Dispute Resolution (ADR) Digital

In the blockchain ecosystem, transactions that are automated, cross-border, and without intermediaries raise significant potential for disputes, especially when smart contracts fail to function as intended. Unfortunately, consumers currently cannot rely on the Consumer Dispute Resolution Agency (BPSK), because this institution only applies to conventional transactions as regulated in Article 45 of the Consumer Protection Law. The absence of a fast and digital-based dispute resolution mechanism can cause consumers to lose access to justice, especially in disputes arising from code errors or automatic execution in smart contracts. In comparison, countries such as Singapore through the Singapore International Arbitration Centre (SIAC) have formulated dispute resolution rules that specifically address digital issues and blockchain technology. In addition, UNCITRAL has encouraged the use of electronic dispute resolution since 1996, providing a framework that member states can adopt to regulate digital dispute resolution. Based on this, it is recommended to establish a Blockchain ADR platform that provides fast, online, and evidence-based smart contract dispute resolution services through digital mediation or arbitration involving certified third parties.

Legal provisions on ADR can be included in the revision of Law No. 30 of 1999. This revision stipulates that disputes arising from blockchain-based digital transactions, including those using smart contracts, can be resolved through ODR mechanisms and conducted out of court using arbitration, mediation, conciliation, and negotiation.

4. Regulatory Collaboration

Supervision of ESG blockchain platforms in Indonesia is still fragmented. OJK regulates the financial sector through POJK 51/2017, Bappebti regulates crypto assets through Regulation No. 11/2022, and Kominfo is authorized over electronic systems and data protection under the ITE Law. Without collaboration between these authorities, consumer protection on ESG blockchain platforms is weak and inconsistent. The European Union, through the Digital Finance Package passed in 2020, emphasized the importance of cross-institutional and inter-country

coordination in supervising the digital financial sector. This package focuses on regulating crypto assets, digital payment technologies, and risks arising from financial technology innovation. In this regard, UNCITRAL also recommends cooperation between national authorities to create a harmonized and effective regulatory framework for regulating financial technology, including digital dispute resolution, to ensure adequate protection for consumers and the industry at the international level. Therefore, it is necessary to form a Joint Regulatory Forum involving OJK, Bappebti, and Kominfo to create an integrated legal framework for ESG blockchain consumer protection, as well as coordinate cross-sector investigations and protection comprehensively. In summary, the reconstruction proposed in this study can be seen in Table 2 below.

TABLE 2. Proposed Reconstruction Model of the Legal Framework for Consumer Protection

Proposed Reconstruction Model	Information	Benefit
Legality of Smart Contracts	1. Clarity of responsible parties. 2. Protection against automatic execution failure. 3. Consumer rights to receive compensation.	Reducing the uncertainty of blockchain transactions
Establishing a Digital ESG Verification Agency	1. Verifying blockchain projects' sustainability claims. 2. Provide public certification of digital ESG projects that meet standards. 3. Protecting consumers from greenwashing.	Protecting consumers from token greenwashing
Establishing ADR Blockchain Platform	1. Fast, online, smart contract evidence-based dispute resolution. 2. Digital mediation or arbitration with third party certification.	Accelerating consumer justice
Regulatory Collaboration by Establishing a Joint	1. Creating a blockchain ESG consumer protection legal framework.	Creating a safe and sustainable digital investment ecosystem

Regulatory Forum OJK-Bappebti-Komi nfo	2. Coordination of cross-sector digital consumer investigations and protection.
--	---

Source: Author, 2024 (edited)

Comparison of Consumer Protection in Blockchain-Based Digital Investments and ESG

1. European Union: MiCA (Markets in Crypto-Assets Regulation)

Consumer protection in blockchain-based digital investments and ESG has become a major concern in various global jurisdictions, one of which is the European Union. Through the Markets in Crypto-Assets (MiCA) regulation which was officially implemented in 2023, the European Union seeks to create a unified and comprehensive legal framework for all its member states in regulating crypto assets. The main objective of this regulation is to provide strong legal protection for consumers who buy, store, and invest in crypto assets, as well as increase transparency towards blockchain-based projects, including tokenization based on environmental, social, and governance (ESG) principles. Several key provisions in MiCA demonstrate the European Union's seriousness in building public trust, including:

- a. *Disclosure Obligations* as regulated in MiCA Title II, crypto asset providers are required to provide accurate, honest, and transparent information before consumers make transactions.
- b. *Whitepaper Regulation*, where all crypto-asset issuers are required to publish a crypto-asset whitepaper that explains in detail the risks, rights and responsibilities of the issued tokens, including sustainability claims (MiCA Article 5).
- c. *Consumer Protection Measures* as stipulated in MiCA Title VI which provides various forms of consumer protection, such as the right to cancel purchases under certain conditions and protection in the event of service failure from crypto asset providers.

d. *Environmental Sustainability Disclosure*, where ESG-based blockchain projects must report their environmental impact transparently and accurately, in order to prevent *greenwashing practices* (MiCA Article 19). With this comprehensive approach, the EU positions itself as a pioneer in consumer protection in the digital investment sector based on high technology and sustainability.

2. Singapore: Payment Services Act (PSA) and ESG Approach

Singapore is one of the countries with the most advanced regulatory approach in fintech and blockchain technology. Through *the Payment Services Act* (PSA) which was enacted in 2019, the country comprehensively regulates various digital payment services and digital asset management, including stablecoins and other digital payment tokens. Although the PSA's focus is on regulating digital payment systems, Singapore has also demonstrated a strong commitment to sustainability issues through the active role of the Monetary Authority of Singapore (MAS). MAS not only serves as a financial supervisory authority, but also as a driver of the integration of ESG principles in the financial services sector. One of its initiatives was the issuance of *the MAS Guidelines on Environmental Risk Management for Banks* in 2020³¹, which provides guidance for financial institutions in managing environmental risks systematically. In addition, MAS also encourages ESG-based innovation through pilot projects such as *Project Greenprint*, which leverages blockchain technology to strengthen sustainability reporting and ESG verification systems digitally. This approach shows how Singapore is not only focused on the stability of the digital financial system but also integrates sustainability values into its rapidly growing financial innovation ecosystem.

3. Consumer Protection in Indonesia

Compared to Singapore and the European Union, Indonesia is still in its early stages in terms of consumer protection for blockchain-based digital investments and ESG. Although Indonesia already has several regulations that touch on this aspect, such as POJK No. 51/2017 which regulates ESG aspects

³¹ Monetary Authority of Singapore, "Guidelines on Environmental Risk Management for Banks," A Singapore Government Agency Website, 2026, <https://www.mas.gov.sg/regulation/guidelines/guidelines-on-environmental-risk-management>.

and Bappebti Regulation No. 11/2022 which regulates crypto asset trading, the regulatory approach in Indonesia is still sectoral and fragmented. There is no single integrated regulation that integrates supervision of digital assets and sustainability in one legal framework, such as MiCA in the European Union or PSA in Singapore. In addition, Indonesia also does not have specific regulations regarding consumer protection in blockchain-based digital ESG investments, such as those carried out by *the Monetary Authority of Singapore* (MAS) through the Environmental Risk Management Guidelines. The absence of an obligation to disclose the environmental impact of blockchain-based ESG tokens is one example of this regulatory imbalance. Thus, compared to Singapore and the European Union, Indonesia still needs to develop a more comprehensive regulatory framework to protect consumers and ensure transparency in ESG-focused digital investments. In summary, a comparison of consumer protection in blockchain-based digital investments and ESG can be seen in Table 3 below.

TABLE 3. Comparison of Consumer Protection in Blockchain-Based Digital Investments and ESG

Aspect	European Union (MiCA)	Singapore (PSA & Greenprint)	Indonesia (Current)
Consumer Protection	Complete and specific	There is but the focus is on digital payments	Fragmented, not yet ESG blockchain specific
ESG Disclosure	Mandatory and standardized	Driven by the Greenprint initiative	There is no mandatory standard for digital ESG verification
Blockchain Regulation	Integrated across the EU	Partial to Payment Services and pilot projects	Partial (crypto assets as commodities, not yet ESG blockchain)

Source: Author, 2024 (edited)

Indonesia's Regulation Adoption Strategy in ESG and Blockchain-Based Digital Investment Consumer Protection

Indonesia's regulatory adoption strategy in protecting digital investment consumers based on ESG (Environmental, Social, and Governance) and blockchain technology is a response to the rapid development of digital financial technology and increasing awareness of sustainable investment. This regulation aims to create a transparent, accountable, and integrity-based investment ecosystem while still protecting consumer rights from the risk of data misuse, information manipulation, and legal uncertainty. The following is the strategy taken in relation to the adoption of Indonesian regulations in protecting digital investment consumers based on ESG and blockchain which can be seen in Table 4.

TABLE 4. Indonesia's Regulation Adoption Strategy in ESG and Blockchain-Based Digital Investment Consumer Protection

Aspect	Inspiration from the European Union and Singapore	Adoption Strategy for Indonesia	Benefit
Legality of Smart Contracts	MiCA recognizes crypto-assets contracts as valid; PSA regulates digital payment contracts.	Revise the ITE Law to recognize the validity of smart contracts as legal contracts and establish standards of responsibility for smart contract providers.	Providing legal certainty for consumers regarding automatic execution
Digital ESG Disclosure and Verification	MiCA requires ESG disclosure, Project Greenprint provides blockchain verification for ESG reporting.	Establish mandatory blockchain-based ESG disclosure regulations under OJK, with the establishment of a Digital ESG Verification Institution.	Preventing greenwashing in ESG tokenization projects
Blockchain Consumer Protection	MiCA regulates consumer rights to refunds and protection against crypto asset failures.	Revise the Consumer Protection Law to cover consumer rights in blockchain-based digital ecosystems, including tokenized ESG investments.	Ensuring basic consumer rights remain protected in digital innovation
Alternative Dispute	SIAC develops blockchain	Establish ADR Blockchain under	Accelerating dispute resolution

Resolution (ADR) Digital	evidence-based Digital Dispute Resolution Rules.	Kominfo or special BPSK, with mediation and arbitration based on smart contract evidence.	based on electronic evidence
Cross-Authority Coordination	The EU Digital Finance Strategy requires cooperation between authorities.	Establish a Digital Regulation Coordination Forum between OJK, Bappebti, and Kominfo to harmonize ESG blockchain consumer protection.	Avoiding regulatory fragmentation and strengthening cross-sectoral supervision
Sustainable Digital Financial Innovation	MAS Project Greenprint develops a blockchain-based ESG data ecosystem.	Encourage private-public collaboration to build a blockchain-based ESG reporting ecosystem in Indonesia (e.g., through IDXCarbon, the Indonesian Carbon Exchange).	Ensuring the sustainability of blockchain-based digital economy in Indonesia

Source: Author, 2024 (edited)

Recommendations for National Legal Policy Reconstruction

1. Drafting of Digital Consumer Protection and ESG Law

Reconstruction of national legal policies in facing the development of digital technology and sustainable investment is important to be conducted through the preparation of the Digital Consumer Protection and ESG Law. Currently, the applicable regulations, namely Law Number 8 of 1999 concerning Consumer Protection, still focus on conventional transaction patterns and have not been able to reach the complexity of digital transactions involving blockchain technology, smart contracts, and ESG (Environmental, Social, and Governance)-based tokenization. Fundamental changes in the digital transaction model that take place automatically without human interaction and

are based on program code in smart contracts, create new forms of legal relationships that have not been comprehensively regulated in existing regulations. On the other hand, consumers are also increasingly faced with claims of sustainability by digital platforms that are not necessarily valid, thus giving rise to the risk of fraud or greenwashing. The urgency of the formation of this new law is based on the need for more adaptive and responsive legal protection. The UNCITRAL Model Law on Electronic Commerce³² has emphasized the importance of adapting the law to the reality of electronic transactions, and the 2023 Markets in Crypto-Assets (MiCA) regulation has regulated consumer rights in the context of crypto assets and ESG tokens. Therefore, Indonesia needs to have a Digital Consumer Protection and ESG Law as a *lex specialist* that provides legal certainty, guarantees consumer rights in the digital ecosystem, and prevents misuse of technology and misleading sustainability claims. The formation of this law is a strategic step to create inclusive legal protection and in accordance with the dynamics of global digital transformation.

2. Establishment of Digital ESG Certification Body

The establishment of the Digital ESG Certification Institution is a strategic step in strengthening sustainability-based digital investment governance in Indonesia, especially those utilizing blockchain technology. In practice, many digital projects claim to be sustainable or environmentally friendly (ESG) initiatives without including evidence or a credible verification mechanism. Without an independent institution that has the authority to verify and validate these claims, the risk of *greenwashing*, namely false or misleading claims about sustainability, is increasing, potentially harming consumers and creating distrust in the sustainable digital ecosystem. This institution is needed to ensure the accuracy and transparency of ESG claims in the form of tokens or other digital projects, as well as provide adequate protection for consumers from the risk of investment fraud. The basis for the establishment of this institution has also been strengthened by international standards and regulations, such as

³² United Nations, Commission On, and International Trade, *UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with Additional Article 5 Bis*, 1998.

reports³³ which emphasizes the importance of an openly verifiable blockchain-based ESG reporting system, and the European Union's 2019 *Sustainable Finance Disclosure Regulation* (SFDR) which requires companies to disclose standardized and auditable ESG data. Therefore, the presence of a Digital ESG Certification Institution in Indonesia will be an important pillar in creating a digital investment ecosystem that is transparent, credible, and socially and environmentally responsible.

3. ADR Blockchain Development

Alternative Dispute Resolution (ADR) mechanism specifically for blockchain transactions is an urgent need in facing the dynamics of dispute resolution in the digital era. The consumer dispute resolution system currently in Indonesia, such as the Consumer Dispute Resolution Agency (BPSK), is still limited to conventional transactions as regulated in Article 45 of the Consumer Protection Law. In fact, *smart contract-based transactions* in the blockchain ecosystem are automatic, cross-jurisdictional, and digital code-based, thus requiring a faster, more flexible, and electronic evidence-based settlement approach.

Blockchain ADR integrated into a digital platform is needed to accommodate the unique character of blockchain transactions, while also addressing the need for speed, efficiency, and fairness in digital dispute resolution. Support for this idea can be found in *the Singapore International Arbitration Centre (SIAC)* through the 2020 *Digital Dispute Resolution Rules*³⁴, which regulates blockchain evidence-based arbitration mechanisms and rapid response. In addition, *the UNCITRAL Technical Notes on Online Dispute Resolution*³⁵ also emphasize the importance of developing a cross-border electronic dispute resolution system that prioritizes efficiency, affordability, and accessibility. Therefore, Indonesia needs to form a Digital ADR specifically for

³³ Forum, "ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance," 2023.

³⁴ Singapore International Arbitration Centre, *Arbitration Rules* (Singapore International Arbitration Centre, 2025), <https://siac.org.sg/siac-rules-2025>.

³⁵ United Nations Commission On and International Trade Law, "Report of Working Group IV (Electronic Commerce) on the Work of Its Seventieth Session (New York, 23–27 March 2026)," vol. 04699 (New York, 2026), <https://docs.un.org/en/A/CN.9/1242>.

blockchain transactions to ensure legal certainty, protect consumers, and maintain the integrity of the national digital economic system.

4. Strengthening Digital Consumer Literacy

Digital literacy in Indonesia is still relatively low. Based on data from the Central Statistics Agency (BPS), the Indonesian Digital Literacy Index in 2023 only reached 3.54 on a scale of 5, reflecting the need to increase public knowledge and understanding of digital technology. This is becoming increasingly crucial in the context of the development of blockchain-based investments and the principles of Environmental, Social, and Governance (ESG). In this case, consumers are faced with the challenge of technical understanding such as how smart contracts work, the risk of ESG greenwashing, and the legal rights inherent in digital transactions. Literacy programs are very important as an effort to mitigate the risk of losses that consumers can experience due to ignorance or misleading information. In addition, adequate digital literacy can also encourage the formation of consumers who are not only technologically proficient but also legally aware. This is in line with the OECD Recommendation on Consumer Protection in E-commerce³⁶, which emphasizes that digital consumer education is a main pillar of modern consumer protection. In Indonesia, the Ministry of Communication and Informatics (Kominfo) has launched the National Digital Literacy Movement since 2023. However, the program is still general and has not specifically touched on important issues such as blockchain or ESG. Therefore, it is necessary to design and implement an integrated digital legal literacy program, with a special focus on blockchain and ESG issues. This program must be national, collaborative, and directly target the educational needs of the community. With this approach, consumer protection in the digital era can be strengthened substantively and sustainably.

5. Integration and Harmonization of Regulations between Institutions

Regulations governing the blockchain sector and investments based on Environmental, Social, and Governance (ESG) principles in Indonesia are

³⁶ OECD, *Recommendation of the Council on Consumer Protection in E-Commerce* (Paris: OECD Publishing, 2016), <http://dx.doi.org/10.1787/9789264255258-en>.

currently fragmented. Each institution has its own authority: the Financial Services Authority (OJK) regulates sustainable finance, the Commodity Futures Trading Supervisory Agency (Bappebti) oversees crypto assets, while the Ministry of Communication and Information (Kominfo) plays a role in regulating electronic transactions and personal data protection. Although these authorities are legally valid, the lack of coordination and harmonization between these institutions actually creates overlapping authorities and potential legal gaps in digital consumer protection, especially in the context of using blockchain technology for ESG investments. The need for regulatory integration is very urgent. Without good coordination between regulators, policy implementation can be out of sync, and digital consumers risk being trapped in an unclear legal framework. Integration between institutions is also important to accelerate the creation of a solid digital consumer protection ecosystem that is responsive to technological developments. This is in line with the EU Digital Finance Strategy³⁷ which emphasizes the need for integration of digital financial supervision to increase the effectiveness of consumer protection. In addition, the UNCITRAL Recommendations also explicitly encourage cross-institutional collaboration in forming national digital regulations³⁸.

As a prescriptive solution, it is necessary to form a Blockchain ESG Regulatory Forum involving OJK, Bappebti, and Kominfo. This forum will function as a coordinating forum that designs integrated regulations and aligns cross-sector policies. With this approach, Indonesia's legal framework in facing the challenges of digital consumer protection in the blockchain and ESG era can be substantially strengthened. This regulatory reconstruction recommendation is prepared based on the identification of the gaps and inconsistencies in existing laws. Based on national laws and international principles, such as those from the OECD, EU, and UNCITRAL, this recommendation offers concrete and targeted prescriptive solutions to strengthen Indonesia's consumer protection

³⁷ European Commission, "Consultation on a New Digital Finance Strategy for Europe / FinTech Action Plan," European Commission, 2020, https://finance.ec.europa.eu/regulation-and-supervision/consultations/2020-digital-finance-strategy_en.

³⁸ United Nations, United Nations, and International Trade, *Taxonomy of Legal Issues Related to the Digital Economy* (Vienna, Austria: UNCITRAL, 2019), <https://uncitral.un.org/sites/default/files/media-documents/uncitral/en/digitaleconomytaxonomy>.

system in facing the dynamics of blockchain and ESG-based digital investment in a fair, inclusive, and sustainable manner.

This study reveals that the regulations in force in Indonesia, such as the Consumer Protection Law No. 8 of 1999³⁹, the Electronic Information and Transactions Law No. 11 of 2008⁴⁰, OJK Regulation No. 51/POJK.03/2017⁴¹ concerning Sustainable Finance, and Bappebti Regulation No. 11 of 2022 concerning crypto assets⁴², have not been able to effectively protect consumers in the context of digital investment based on the principles of Environmental, Social, and Governance (ESG) and blockchain technology. Various legal gaps are still found, such as the non-recognition of the legality of smart contracts, the absence of a digital ESG verification mechanism, the absence of a blockchain-based dispute resolution system, and the fragmentation of coordination between regulatory institutions. This condition reflects that the existing legal system is not yet adaptive to the complexity of automatic transactions and sustainability based on digital technology.

Compared to international regulatory frameworks, such as the European Union's Markets in Crypto-Assets Regulation (MiCA)⁴³ and Singapore's Payment Services Act (PSA)⁴⁴, consumer protection in Indonesia is still far behind. MiCA has set transparent disclosure obligations for crypto assets and ESG tokens, while Singapore has developed Project Greenprint for

³⁹ Republic of Indonesia, "Law of the Republic of Indonesia Number 8 of 1999 Concerning Consumer Protection" (1999).

⁴⁰ Republic of Indonesia, "Law Of The Republic Of Indonesia No. 11 Of 2008 Concerning Electronic Information And Transactions" (2008), http://www.flevin.com/id/lgso/translations/JICA_Mirror/english/4846_UU_11_2008_e.html.

⁴¹ Financial Services Authority (OJK), "OJK Regulation Number 51/POJK.03/2017 Concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies" (2017), <https://sustainability.idx.co.id/regulation-and-guidance/ojk-regulation-no-51-pojk-03-2017-the-implementation-of-sustainable-fi>.

⁴² Bappebti, "Bappebti Regulation Number 11 of 2022 Concerning Determination of List of Crypto Assets That Can Be Traded in the Physical Crypto Asset Market" (2022), https://bappebti.go.id/pbk/sk_kep_kepala_bappebti/detail/10722.

⁴³ European Parliament and of the Council, "Regulation (Eu) 2023/1114 Of The European Parliament And Of The Council of 31 May 2023 on Markets in Crypto-Assets, and Amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937" (2023), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1114>.

⁴⁴ Monetary Authority of Singapore, "Payment Services Act 2019" (2019), <https://sso.agc.gov.sg/act/psa2019>.

blockchain-based ESG reporting⁴⁵. In contrast, regulations in Indonesia are still sectoral and have not explicitly regulated consumer rights in blockchain-based digital transactions and ESG.

This finding reinforces the urgency to reconstruct the consumer protection paradigm, from one that was previously oriented towards conventional contractual relationships to a system that adapts to digital-automatic transactions based on blockchain technology⁴⁶. Legal relationships that were previously determined by manual agreements between parties have now shifted to automatic program-based interactions that run without human intervention. Therefore, the concept of consumer legal protection must also transform along with changes in the digital ecosystem.

This study contributes to filling the gap in the literature on consumer protection in ESG-based digital investment by offering a legal reconstruction model. This model includes four main elements: recognition of the legality of smart contracts, the establishment of a digital ESG verification institution, the development of blockchain-based alternative dispute resolution (ADR), and harmonization of regulations between national authorities^{47 48}. Based on these findings, five important policy steps are recommended: the formulation of the Digital and ESG Consumer Protection Law, the establishment of a Digital ESG Verification Institution, the development of a Blockchain ADR mechanism, strengthening consumer digital literacy, and integration of cross-agency supervision^{49 50}.

Conclusion

⁴⁵ The Monetary Authority of Singapore (MAS), “MAS and Industry to Pilot Digital Platforms for Better Data to Support Green Finance,” The Monetary Authority of Singapore (MAS), 2021, <https://www.mas.gov.sg/news/media-releases/2021/mas-and-industry-to-pilot-digital-platforms-for-better-data-to-support-green-finance>.

⁴⁶ Nations, On, and Trade, *UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with Additional Article 5 Bis*.

⁴⁷ Forum, “ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance,” 2022.

⁴⁸ Centre, *Arbitration Rules*.

⁴⁹ OECD, *Recommendation of the Council on Consumer Protection in E-Commerce*.

⁵⁰ Commission, “Consultation on a New Digital Finance Strategy for Europe / FinTech Action Plan.”

Research on regulations in Indonesia (Consumer Protection Law, ITE Law, POJK 51/2017, and Bappebti Regulation 11/2022) found that the national legal framework is still partial, sectoral, and unresponsive to changes in digital investment technology. The main gaps lie in the absence of legal recognition of smart contracts, the absence of a blockchain-based sustainability claim verification mechanism, the absence of blockchain-based dispute resolution, and weak oversight coordination between institutions. As a scientific contribution, this study offers a new legal framework reconstruction model consisting of: (1) legal recognition of smart contracts as a valid contractual instrument, (2) the establishment of a blockchain-based digital ESG verification institution, (3) the development of digital Alternative Dispute Resolution (ADR) for automated transactions, and (4) regulatory integration between national authorities such as the OJK, Bappebti, and Kominfo. This model is expected to strengthen consumer protection in the era of blockchain-based sustainable finance. The practical implications of this study demonstrate the urgency of drafting a Digital Consumer Protection and ESG Law in Indonesia. Furthermore, it is crucial to build a digital literacy ecosystem and blockchain-based ESG verification mechanisms to maintain transparency and accountability in sustainable investment. This study also provides a normative basis for policymakers to accelerate national digital regulatory reform. A limitation of this research lies in its juridical-normative approach, which has not examined empirical data on consumer behavior in digital ESG investment. Therefore, future research is recommended to adopt a quantitative or mixed-methods approach, as well as conduct comparative studies with other jurisdictions such as the United States, Japan, and the European Union to strengthen the validity of the proposed legal reconstruction model. The limitations of this study lie in the approach used, namely the juridical-normative approach that does not include empirical studies on consumer experiences in using ESG-based blockchain platforms. Therefore, further research is recommended to use empirical approaches, such as user surveys and interviews, as well as comparative studies with other jurisdictions such as the United States

and Japan to enrich and strengthen the development of national legal models that are responsive to global dynamics.

References

- (MAS), The Monetary Authority of Singapore. “MAS and Industry to Pilot Digital Platforms for Better Data to Support Green Finance.” The Monetary Authority of Singapore (MAS), 2021. <https://www.mas.gov.sg/news/media-releases/2021/mas-and-industry-to-pilot-digital-platforms-for-better-data-to-support-green-finance>.
- (OJK), Financial Services Authority. OJK Regulation Number 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies (2017). <https://sustainability.idx.co.id/regulation-and-guidance/ojk-regulation-no-51-pojk-03-2017-the-implementation-of-sustainable-fi>.
- Bappebti. Bappebti Regulation Number 11 of 2022 concerning Determination of List of Crypto Assets that Can Be Traded in the Physical Crypto Asset Market (2022). https://bappebti.go.id/pbk/sk_kep_kepala_bappebti/detail/10722.
- Bhandari, Mohan, Ghanashyam Tiwari, and Maheshwor Dhakal. “Enhancing Transparency and Accountability in Sustainable Finance Through Blockchain Technology : A Systematic Review of the Literature.” *Journal of Intelligent Management Decision* 4, no. 1 (2025): 23–43. <https://doi.org/Journal of Intelligent Management Decision>.
- Centre, Singapore International Arbitration. *Arbitration Rules*. Singapore International Arbitration Centre, 2025. <https://siac.org.sg/siac-rules-2025>.
- Commission, European. “Consultation on a New Digital Finance Strategy for Europe / FinTech Action Plan.” European Commission, 2020. https://finance.ec.europa.eu/regulation-and-supervision/consultations/2020-digital-finance-strategy_en.
- Council, European Parliament and of the. Regulation (Eu) 2023/1114 Of The European Parliament And Of The Council of 31 May 2023 on markets in crypto-assets, and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937 (2023). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1114>.

- Development, Organisation for Economic Co-operation and. "Blockchain and Consumer Protection: Exploring Global Regulatory Approaches. Organization for Economic Co-Operation and Development." OECD, 2023.
<https://www.oecd.org/digital/blockchain-and-consumer-protection.htm>.
- Forum, World Economic. "Blockchain for Scaling Climate Action," 2023.
https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www3.weforum.org/docs/WEF_Blockchain_for_Scaling_Climate_Action_2023.pdf&ved=2ahUKEwj12aHQRbqUAXUT2DgGHY7oEP4QFnoECBcQAQ&usg=AOvVaw0WPQrPfwH_EetxZr8v6ZEO.
- . "ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance," 2022.
<https://www.weforum.org/whitepapers/esg-disclosure-and-blockchain-enhancing-transparency-in-green-finance>.
- . "ESG Disclosure and Blockchain: Enhancing Transparency in Green Finance," 2023.
<https://www.weforum.org/whitepapers/esg-disclosure-and-blockchain-enhancing-transparency-in-green-finance>.
- Gunawan, I Ketut, Ninda Lutfiani, Qurotul Aini, and Fitria Marwati Suryaman. "Smart Contract Innovation and Blockchain-Based Tokenization in Higher Education." *Journal of Education Technology* 5, no. 4 (2021): 636–44.
<https://doi.org/https://doi.org/10.23887/jet.v5i4.40665>.
- Hendri Silitonga, Ratna Artha Windari Dewarto, Si Ngurah Ardhya. "Analisis Keabsahan (Smart Contract) Transaksi Aset Digital Di Platform Ethereum Dalam Teknologi Blockchain." *Jurnal Komunitas Yustisia* 7, no. 1 (2024).
<https://ejournal.undiksha.ac.id/index.php/jatayu/article/view/94160>.
- Hoxha, Marsela Thanasi-Boçe and Julian. "Blockchain for Sustainable Development : A Systematic Review." *Sustainability* 17, no. 11 (2025): 4848. <https://doi.org/https://doi.org/10.3390/su17114848>.
- Indonesia, Republic of. Law of the Republic of Indonesia Number 8 of 1999 concerning Consumer Protection (1999).
- Institute, The European Law. *ELI Principles on Blockchain Technology, Smart Contracts and Consumer Protection*. Vienna, Austria: European Law Institute, 2023.
https://www.europeanlawinstitute.eu/fileadmin/user_upload/p_eli/Publications/ELI_Principles_on_Blockchain_Technology__Smart_Contracts_a

- nd_Consumer_Protection.
- Junida, Ade Irma. "Bappebti: Jumlah Pelanggan Aset Kripto Terdaftar Capai 18,25 Juta." *Antara: Kantor Berita Indonesia*, December 16, 2023. <https://www.antaraneews.com/berita/3874497/bappebti-jumlah-pelanggan-aset-kripto-terdaftar-capai-1825-juta>.
- Kuspraningrum, Emilda. "Keabsahan Kontrak Elektronik Dalam UU ITE Ditinjau Dari Pasal 1320 KUHPerdata Dan UNCITRAL Model Law On Electronic Commerce (The Legality of Electronic Contract in the Enactment of Information and Electronical Transaction Derived from Article 1320 Civil)." *Risalah Hukum* 7, no. 2 (2011). <https://e-journal.fh.unmul.ac.id/risalah/article/view/189/104>.
- Mohammad Rashed Hasan Polas, Ahmed Imran Kabir, Abu Saleh Md. Sohel-Uz-Zaman, Ridoan Karim, Mosab I. Tabash. "Blockchain Technology as a Game Changer for Green Innovation: Green Entrepreneurship as a Roadmap to Green Economic Sustainability in Peru." *Journal of Open Innovation: Technology, Market, and Complexity* 8, no. 2 (2022). <https://doi.org/https://doi.org/10.3390/joitmc8020062>.
- Nations, United, United Nations, and International Trade. *Taxonomy of Legal Issues Related to the Digital Economy*. Vienna, Austria: UNCITRAL, 2019. <https://uncitral.un.org/sites/default/files/media-documents/uncitral/en/digitaleconomytaxonomy>.
- Nations, United, Commission On, and International Trade. *UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with Additional Article 5 Bis*, 1998.
- Noviya, Neri Aslina & Anis. "Legal Responsibility in Smart Contracts in Blockchain Transactions." *IPSO JURE* 3, no. 1 (2026): 57–73. <https://doi.org/https://doi.org/10.62872/d8kn5x96>.
- OECD. *Recommendation of the Council on Consumer Protection in E-Commerce*. Paris: OECD Publishing, 2016. <http://dx.doi.org/10.1787/9789264255258-en>.
- On, United Nations Commission, and International Trade Law. "Report of Working Group IV (Electronic Commerce) on the Work of Its Seventieth Session (New York, 23–27 March 2026)." Vol. 04699. New York, 2026. <https://docs.un.org/en/A/CN.9/1242>.
- Prabowo, Anto. "Siaran Pers: Presiden Dorong Sinergi Perkuat Pemulihan Ekonomi, Peluncuran Taksonomi Hijau Indonesia." Deputi Komisioner Hubungan Masyarakat dan Logistik OJK, 2022.

- <https://ojk.go.id/id/berita-dan-kegiatan/siaran-pers/Pages/Presiden-Dorong-Sinergi-Perkuat-Pemulihan-Ekonomi-.aspx>.
- Programme, The United Nations Environment. "Blockchain Technology and Environmental Sustainability." The United Nations Environment Programme (UNEP), 2020. <https://www.unep.org/resources/emerging-issues/blockchain-technology-and-environmental-sustainability>.
- Republic of Indonesia. Law Of The Republic Of Indonesia No. 11 Of 2008 Concerning Electronic Information And Transactions (2008). http://www.flevin.com/id/lgso/translations/JICA-Mirror/english/4846_UU_11_2008_e.html.
- Roy, Jewel Kumar, and László Vasa. "Financial Technology and Environmental, Social and Governance in Sustainable Finance: A Bibliometric and Thematic Content Analysis." *Discover Sustainability* 6, no. 1 (2025): 148. <https://doi.org/10.1007/s43621-025-00934-2>.
- Sanarta, Krisna. "Mengenal ESG Dan Manfaatnya Bagi Perusahaan." *Hukumonline.Com*, July 2023. <https://rcs.hukumonline.com/insights/esg>.
- Singapore, Monetary Authority of. "Guidelines on Environmental Risk Management for Banks." A Singapore Government Agency Website, 2026. <https://www.mas.gov.sg/regulation/guidelines/guidelines-on-environmental-risk-management>.
- . Payment Services Act 2019 (2019). <https://sso.agc.gov.sg/act/psa2019>.
- Sulistiyono, Korintus Wilson Horas Hutapea & Adi. "Keabsahan Smart Contract Dengan Teknologi Blockchain Menurut Kitab Undang-Undang Hukum Perdata Dintandai Dengan Teknologi Berbasis Digital Yang Terus Mengalami Kemajuan Pesat. Perubahan Ini Munculnya Mata Uang Kripto. Ini Pada Dasarnya Adalah Program Ko." *Aliansi: Jurnal Hukum, Pendidikan Dan Sosial Humaniora* 1, no. 3 (2024): 86–94. <https://doi.org/https://doi.org/10.62383/aliansi.v1i3.177>.
- Valilai, Meysam Moheby & Omid Fatahi. "Examining the Role of Blockchain in Enhancing Transparency and Traceability in Sustainable Supply Chains." Bremen, Germany, 2026. <https://doi.org/https://doi.org/10.31224/6270>.
- Weatherill, Geraint G. Howells & Stephen. *Consumer Protection Law*. Aldershot: Ashgate Publishing, 2005.
- YanJun, Guo. "Application of Blockchain Technology in Green Finance and Evaluation of Its Economic Effects." *Journal of Posthumanism* 5, no. 5 (2025): 2239–64.

<https://doi.org/https://doi.org/10.63332/joph.v5i5.1613>.

Acknowledgment

We would like to express our gratitude to the Directorate of Research, Technology, and Community Service (DRTPM) for funding Basic Research in year 2025 under Contract Number: 14/LP2MUWH/PFR/V/2025

Funding Information

Directorate of Research, Technology, and Community Service (DRTPM)

Conflicting Interest Statement

The authors state that there is no conflict of interest in the publication of this article.

Publishing Ethical and Originality Statement

All authors declared that this work is original and has never been published in any form and in any media, nor is it under consideration for publication in any journal, and all sources cited in this work refer to the basic standards of scientific citation.

Generative AI Statement Statement

N/A