

# ISRG JOURNAL OF ECONOMICS AND FINANCE (ISRGJEF)



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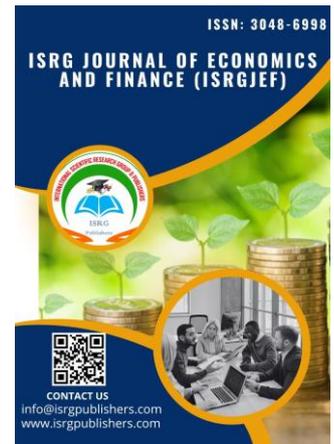
Abbreviated Key Title: ISRG J Econ Fin.

ISSN: 3048-6998 (Online)

Journal homepage: <https://isrgpublishers.com/isrgjef-2/>

Volume – 3 Issue - I (January- February) 2026

Frequency: Bimonthly



## A study from the perspective of international economic law with an emphasis on the development of the green economy (the application of blockchain technology)

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| Received: 01.02.2026 | Accepted: 06.02.2026 | Published: 08.02.2026

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### Abstract

*The development of new technologies, especially blockchain technology, as one of the main achievements of recent decades, has been influential not only in the fields of information and communication technology, but also in the field of international economic law. The green economy or environmental economy has attracted the attention of many governments in recent decades, and the mutual effects of the economy and the environment have become an undeniable reality; in such a way that economic policies affect the environment and, in turn, the economy is affected by environmental changes.*

*The present study, which was conducted using a descriptive-analytical method, has attempted to answer the fundamental question of what position blockchain technology has in international economic law and how it can facilitate the development of the green economy? Blockchain technology has a special position in international economic law. Blockchain, as a secure and decentralized technology infrastructure, is effective in a variety of cases, from international trade to supply chain management and facilitating e-commerce.*

*Blockchain technology can improve the performance of green economic systems by creating transparency, reducing fraud, fast data transfer, promoting green trade and better management of natural resources. Also, the approach of international economic law towards blockchain technology requires the development of appropriate rules and regulations to ensure the security and transparency of activities in this area. Cooperation between governments, international organizations and industrialists is essential for the development of a green economy and the conservation of natural resources.*

**Keywords:** Green Economy, Green Trade, International Economic Law, Blockchain Technology, Environment

## Introduction

International economic law refers to the sets of international rules and agreements that are regulated in the economic, commercial and financial fields between countries. International economic law has been formed with the aim of encouraging international economic interactions, facilitating trade, protecting property rights and managing disputes related to economic activities. The formation of international environmental law has gradually led the international community to focus its attention on various environmental issues.

One of the topics that entered the economic literature since the 1970s was the issue of “green products”, “green economy or green growth”.<sup>1</sup> The green economy approach is to pay attention to the limitations of the environment and its vulnerability, despite addressing the traditional and main goals of economics, issues such as resource renewal, excessive exploitation, the concept of environmental costs, and the irreparable damage to the environment, etc., have gradually been taken into account as the green economy has become more widespread, and today, humanity is witnessing that the UN Environment Department considers sustainable development to be due to the formation of a green economy. In recent decades, the development of a green economy as a solution for protecting the environment and making optimal use of natural resources has received unprecedented attention, and by emphasizing sustainable production and the use of new technologies, it addresses economic development alongside environmental protection.

In this regard, blockchain technology, as one of the innovative and powerful technologies, provides many capabilities for the development of a green economy. Blockchain is a secure and transparent technology that, through a chain of information blocks, enables the recording and verification of transactions and data transmission without the need for central intermediaries.

This technology provides unique capabilities such as high transparency and security, reducing costs and time related to transactions, and the ability to prove the accuracy and authenticity of information; therefore, blockchain has been considered as a powerful tool in the development of the green economy. In this study, we will examine the role of blockchain technology in the development of the green economy using the approach of international economic law.

First, we will evaluate the concepts and definitions related to blockchain technology and the development of the green economy. Second, we will examine the position of blockchain technology in international economic law. Third, we will analyze the role of blockchain technology in the development of the green economy. Fourth, we will examine the challenges and solutions related to the use of blockchain in the development of the green economy. Fifth, we will evaluate the approach of international economic law regarding the role of blockchain technology in the development of the green economy.

This research will provide a usable achievement to improve the performance of blockchain in the development of the green economy and will help develop appropriate policies and strategies

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<sup>1</sup> Mohammad Hossein Ramezani Ghavamabadi, “Green Economy: A Step Towards Realizing Sustainable Development in International Environmental Law,” *Encyclopedia of Economic Law*, 6 (2014), 1.

for the optimal use of blockchain technology in the development of the green economy.

### 1. Concepts

The following topics will examine and analyze the concept of blockchain technology and the green economy.

#### 1.1 Blockchain Technology

Blockchain technology is a new technology that is used as a decentralized and secure system for recording and transferring information and data. Blockchain was initially recognized as the main infrastructure for digital currencies such as Bitcoin, but today it is also used in various other industries and sectors.<sup>2</sup> Blockchain works as a block chain of information. Each block contains information that is stored in it and is connected online to the previous block.

The information in each block is encrypted using a hash function<sup>3</sup> and each block has a unique identifier called a hash that references the next block. The most important feature of blockchain is its security. The information in the blockchain is protected using complex cryptographic algorithms, and any changes to the blocks are quickly detected.

In addition, the blockchain operates in a decentralized manner, meaning that no central person or organization has control over it, and all members work on the information and confirm changes at the same time. The most important applications of blockchain include:

- a) Digital currencies: Blockchain is used as the main infrastructure for digital currencies such as Bitcoin and Ethereum. Blockchain records and verifies transactions in a transparent and secure manner.
- b) Supply chain: Blockchain is used in the supply chain industry.<sup>4</sup> Blockchain tracks the movement of goods from origin to destination and ensures their security and authenticity.
- c) Smart contracts: Using blockchain, smart contracts<sup>5</sup> are automatically executable. These contracts automatically enforce the rules and conditions set between the parties to the contract without the need for an intermediary.
- d) Data security: Blockchain is used as a secure platform for storing and managing data. Information on the blockchain is stored using strong and distributed encryption, which ensures its security.
- e) Finance and banking: Blockchain It plays a fundamental role in financial and banking operations. Possible applications include fast and secure transfer of funds, settlement of accounts, issuance of financial documents, and international payments.<sup>6</sup>

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<sup>2</sup> Chiang Chun-Wei, Betanzos Eber & Saiph Savage, “The Challenges and Trends of Deploying Blockchain in the Real World for the Users’ Need”, *Journal of Cyberspace Studies*, 3, 2(2019), 4.

<sup>3</sup> Hash

<sup>4</sup> . Supply Chain

<sup>5</sup> . Smart Contracts

<sup>6</sup> . Daniel Alfred, et al., “Blockchain Technologies: Smart Contracts for Consumer Electronics Data Sharing and Secure Payment”, *Electronics*, 12, 1(2022), 3.

## 1.2 Green Economy

Greening the economy is the process of transforming trade and infrastructure so that they thrive on the basis of sustainable environmental protection, investment and economic development.<sup>7</sup> In general, green economy means a sustainable economy or an economy that is environmentally friendly.

The United Nations Environment Programme has defined this concept as a “green economy” that achieves improved human well-being and social equity, while reducing environmental risks and ecological deficits and leading to economic growth.<sup>8</sup> There are two perspectives for achieving sustainability in the field of green economy, which are:

- a) Improving economic conditions should not be limited by environmental concerns and environmental problems should be completely abandoned;
- b) Sustainable economic development should be accompanied by preserving and improving the quality of the environment. The second perspective is certainly correct, because ignoring environmental problems threatens economic sustainability in the long term.

Environmental sustainability is a process that regulates environmental interactions with the idea and attitude of environmental protection based on ideal behavior. Sustainability in the use of the environment requires that humans use natural resources to the extent that these resources are naturally replaced.

Increasing resource utilization and reducing waste is the main goal of sustainable natural resource management. Green economy refers to a sustainable approach to economic development that ensures harmony between economic growth, environmental protection, and social balance.<sup>9</sup>

Green economic development means developments that Along with economic growth, it aims to protect the environment and use natural resources optimally. In other words, to meet economic needs, we must seek solutions that can reduce the harmful effects on the environment and manage natural resources sustainably. Considering concepts such as climate change, air pollution, biodiversity loss, and other environmental problems, green economy development relies on efforts to improve economic performance in order to protect the environment and humans.<sup>10</sup> Some of the key principles and approaches of green economy development include:

- 1) Reducing greenhouse gases: Green economy development seeks to reduce the emission of greenhouse gases that are harmful to the environment. These goals

<sup>7</sup> Sajjad Sarwari, “Green Economy”, Nesha Alam Publication, 2, 3 (2011), 36.

<sup>8</sup> Abdul Rehman Khan, et al., “Technological Revolution and Circular Economy Practices: A Mechanism of Green Economy”, Sustainability, 14, 8(2022), 5.

<sup>9</sup> 9. Muhammad Khalid Anser, et al., “Does globalization affect the green economy and environment? The relationship between energy consumption, carbon dioxide emissions, and economic growth”, Environmental Science and Pollution Research, 28, 37(2021), 7.

<sup>10</sup> . Dalia D’Amato & Jouni Korhonen, “Integrating the green economy, circular economy and bioeconomy in a strategic sustainability framework”, Ecological Economics, 188, 2(2021), 6.

can include using renewable energy sources, optimizing energy consumption, and increasing energy efficiency.

- 2) Using sustainable natural resources: Green economy seeks to use natural resources optimally, which includes protecting water resources, responsibly managing forests, managing waste, and preserving biodiversity.
- 3) (Development of new technologies: Green economy development focuses on new technologies that improve economic performance while reducing environmental impacts and includes clean technologies, renewable energies, waste management technologies, and natural resource management tools.
- 4) Sustainable development: Green economy seeks sustainable development, which means meeting financial needs without wasting future resources and opportunities. This includes a balance between the economy, the environment, and society.

Green economy development increases resource productivity, creates new jobs, reduces environmental pollution, and makes organizations and societies more sustainable and resilient to environmental changes. Sustainable development is very important in today's world and helps the economy adapt to environmental issues.<sup>11</sup>

## 2. The Place of Blockchain in International Economic Law

Blockchain technology has a special place in international economic law and, as a secure and decentralized technology infrastructure, is effective in various cases from international trade to supply chain management and facilitating electronic commerce. Next, we will examine the function of blockchain technology in international economic conventions and the principles of international economic law.

### 2.1 Blockchain and International Economic Conventions

Some of the famous international economic conventions are: Convention on Contracts for the International Sale of Goods, Convention on the Settlement of Investment Disputes between States and Nationals of Other States,

International Convention on Trade in Endangered Species of Wild Fauna and Flora, Customs Convention on the International Transport of Goods and International Convention on the Suppression of the Financing of Terrorism. In various conventions, blockchain can play an important role in improving security and transparency.

In the Convention on the International Sale of Goods, blockchain has the potential to play a fundamental role in preventing fraud and increasing transparency in international commercial transactions. Using blockchain, information about commercial contracts and transactions is recorded and stored in a decentralized and reliable system.

This allows business processes to be improved and benefits from accurate and reliable information about contracts. Blockchain is not directly mentioned in the text of the Convention on the Settlement of Investment Disputes between States and Nationals of

<sup>11</sup> Larissa Batrancea, et al., “An Empirical Investigation on the Transition Process toward a Green Economy”, Sustainability, 13, 23(2021), 5.

Other States. However, some aspects of blockchain could be effective in the resolution of investment disputes.<sup>12</sup>

For example, blockchain can help improve the transparency of transactions and information related to dispute settlement by creating an immutable and transparent ledger. The permanent and immutable record of transactions in the blockchain can also be used as reliable proof for issues related to the settlement of investment disputes.

The high security in the blockchain prevents circles of influence and attempts to change data in the settlement of disputes. The dispute settlement process can be time-consuming due to mutual changes and a large number of documents. Blockchain can improve this process.

Although blockchain is effective in some aspects of the settlement of investment disputes, it should be noted that the social, legal and technical nature of such technology requires a process of adaptation and trust. In the Convention on International Trade in Endangered Species of Wild Fauna and Flora, blockchain can help trace the origin of smuggled goods and protect biodiversity.

The Customs Convention on the International Carriage of Goods, as an international rule in the field of international sale of goods, does not directly use blockchain. The Convention regulates the rules related to international sales and the rights and obligations of the parties to the transaction.

However, depending on how the technology is implemented and used, blockchain can be useful in various areas related to customs. For example, blockchain can be an effective tool to improve transparency in customs transactions, accurately track the whereabouts of goods, and even increase security and reduce fraud. In the International Convention for the Suppression of the Financing of Terrorism, blockchain helps to conduct financial transactions transparently and without intermediaries. This technology prevents fraud and deviations from financial laws.

It also improves the review and monitoring of financial activities by creating a permanent record of transactions. Although blockchain has great potential in the field of national financial regulators, it should be noted that trust in this technology and its compliance with national laws determine its acceptance and use.<sup>13</sup>

## 2.2 Blockchain and the Principles of International Economic Law

- a) National Independence Principle:<sup>14</sup> Blockchain protects sensitive national information by providing an anti-fraud and security system based on cryptography. Blockchain technology is able to prevent external interference in data and economic decisions.

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<sup>12</sup> . Gautami Tripathi, Mohd Abdul Ahad & Gabriella Casalino, “A comprehensive review of blockchain technology: Underlying principles and historical background with future challenge”, *Decision Analytics Journal*, 9, 1(2023), 5.

<sup>13</sup> . H. Umarov, “The impact of blockchain and cryptocurrencies on the global financial system: Prospects and contradictions”, *Finance and Credit*, 27, 9(2021), 10.

<sup>14</sup> Principle of National Independence

- b) Private Property Rights Principle:<sup>15</sup> Blockchain protects private property rights in economic exchanges by creating a secure and transparent structure. This technology also increases confidence and trust in transactions.
- c) Free International Trade Principle:<sup>16</sup> Blockchain has the ability to facilitate and streamline international trade processes. Blockchain records changes in transactions in real time and prevents fraud, which gives international trade more confidence and credibility.
- d) Fair Distribution Principle:<sup>17</sup> Blockchain can help distribute economic resources and information fairly. What is recorded in the blockchain system is available to all parties, and reduces undesirable changes in the distribution of information.
- e) Principle of Commitment to Economic Development:<sup>18</sup> By increasing confidence in economic transactions, blockchain can facilitate and improve economic development cooperation between countries.
- f) Principle of Environmental Protection:<sup>19</sup> Blockchain is used to prevent environmental damage and more effectively manage environmental issues. This technology accurately records the environmental history of goods and services.
- g) Principle of Sustainable Development:<sup>20</sup> By creating a transparent and secure platform, blockchain helps to achieve sustainable economic development and prevents unlimited consumption of resources. This technology helps to promote the concept of conservation in the use of resources.<sup>21</sup>

## 3. Impact of Blockchain on International Economic Law

Blockchain, as a new technology, has significant impacts on the field of international economic law. Blockchain technology, using cryptography technology, provides the possibility of preserving intellectual and material property rights; therefore, the ownership of some It records assets such as intellectual property and customizations in a transparent and secure manner, increasing trust and encouraging innovation and technology transfer in the field of green economy development.

Also, using blockchain, it is possible to carry out secure and transparent transactions between the parties to international contracts, because all transactions are recorded and proven in the blockchain and cannot be changed or forged. The embryo of the

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<sup>15</sup> Principle of Private Property Rights

<sup>16</sup> . Principle of Free International Trade

<sup>17</sup> Principle of Equitable Distribution

<sup>18</sup> Principle of Commitment to Economic Development

<sup>19</sup> Principle of Environmental Protection

<sup>20</sup> Principle of Sustainable Development

<sup>21</sup> Cristina Viano, et al., “Civic Blockchain: Making blockchains accessible for social collaborative economies”. *Journal of Responsible Technology*, 15, (2023), 7.

subject increases trust in international trade transactions and protects contractual rights.<sup>22</sup>

One of the most important effects of blockchain is that it can play a vital role in sustainable development and environmental protection. With blockchain, transactions related to renewable resources and green energy production can be tracked and recorded. Also, by creating a transparent and traceable supply chain using blockchain, it can prevent the misuse of natural resources and facilitate the monitoring of environmental activities.

Given the international nature of blockchain, interaction between blockchain and the global computer system is very necessary. In this context, the need for changes in international rules and regulations to enable the use of blockchain and at the same time determine its rights and responsibilities.

It is also very necessary to educate the judiciary about blockchain and its use in the field of international economic law.<sup>23</sup> Blockchain, as a new technology, has a significant impact on legislation and international changes. Since blockchain allows the recording and verification of information using a strong cryptographic algorithm, this technology can serve as a powerful tool for increasing security and transparency in legal activities and international changes.

For example, blockchain can be used in the process of verifying identity, legal documents and electronic signatures, which can be very useful for facilitating international legal and commercial activities. Governments around the world have implemented programs to develop a green economy using blockchain. Blockchain can be used in the management of natural resources such as solar and wind energy, reducing air and water pollution, managing waste and facilitating green trade.<sup>24</sup>

Using blockchain, it is possible to create intelligent systems for continuous monitoring and control of natural resources and distribution of economic resources for sustainable development are provided.

Blockchain can have a significant impact on international trade interactions. Using blockchain, it is possible to record and verify international trade transactions without the need for traditional intermediaries such as banks and finance companies. Such issues significantly reduce the costs and time associated with international transactions and increase security and transparency in these interactions.

With the expansion of the use of blockchain in the development of the green economy and international trade interactions, the need for changes in international laws and regulations to support this technology arises. Some of the challenges include determining liability in the event of errors or violations in the blockchain system, protecting intellectual property rights and privacy, and

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<sup>22</sup> Weihua Liu, et al., "Collaborative adoption of blockchain technology: A supply chain contract perspective", *Frontiers of Engineering Management*, 10, 1(2023), 11.

<sup>23</sup> Lihong Huang, "Regulation of Regional Economic Law Laws Incorporating Adaptive Differential Evolutionary Algorithms from a Blockchain Perspective", *Applied Mathematics and Nonlinear Sciences*, 9, 1(2024), 5.

<sup>24</sup> M Adeel Munir, et al., "Blockchain Adoption for Sustainable Supply Chain Management: Economic, Environmental, and Social Perspectives", *Frontiers in Energy Research*, 10, (2022), 5.

determining rules related to identity verification and transactions related to blockchain. To support blockchain, international rules and regulations must be updated according to the new needs and characteristics of this technology.<sup>25</sup>

#### **4. The role of blockchain technology in the development of the green economy**

Blockchain technology is currently recognized as one of the most important and innovative technologies in the field of green economy development. In the following, we will discuss the role of blockchain technology in the development of the green economy in various cases.

##### **4.1 Blockchain and green goods**

Many countries have produced products with environmental features that have been marketed under the green brand name. It is a misconception that nature is bigger than humans think. Population growth cannot be stopped, and urban energy consumption is two or three times that of rural areas. These are new technologies that offer humans a reasonable and rational use so that clean and renewable energy can be used. Blockchain technology and sustainable goods have a dynamic relationship with each other and can be effective in the development of this industry.

In the following, we will mention several examples of the relationship between blockchain technology and green goods. One of the major challenges in the green goods market is the lack of transparency in the supply chain.<sup>26</sup> Blockchain restores trust in the green goods market by providing a transparent and publicly available, immutable record of transactions.

Consumers can easily track the source of raw materials, production processes, and working conditions through blockchain, making decision-making more robust. Blockchain enables direct, unmediated interactions between buyers and sellers. The peer-to-peer approach<sup>27</sup> in the green goods market can help promote energy-free trade and limit the complexities and costs associated with intermediaries.

Using blockchain, more information can be provided about the environmental impacts of products throughout their life cycle, from resource use to storage and disposal. This gives consumers confidence that they are purchasing a green product, and it can also be used as a tool for companies in blockchain technology to assess and enhance the quality of green products. The use of blockchain can also serve as a tool for monitoring and quality control in the green goods industry.

Recording information on the blockchain allows samples and products to be further tested and analyzed, thus ensuring the quality and safety of green goods. Using blockchain, incentive programs can be implemented for consumers in the field of green goods. Through mechanisms such as granting valuable tokens to

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<sup>25</sup> Ausrine Šilenskytė, Jurgita Butkevičienė & Andrius, Bartminas. "Blockchain-based connectivity within digital platforms and ecosystems in international business", *Journal of International Management*, 30, 3(2024), 8.

<sup>26</sup> . Yehia Ibrahim Alzoubi & Aneil Mishra, "Green blockchain - A move towards sustainability", *Journal of Cleaner Production*, 430, (2023), 6.

<sup>27</sup> Ibid.

consumers who use green goods, it is possible to encourage a green lifestyle.<sup>28</sup>

#### 4.2 Blockchain and Clean Energy

The use of renewable energy and low-carbon technologies is considered the most important sub-sector of the green economy, because on the one hand, the majority of emissions occur during energy production and, on the other hand, investment in this sector requires large financial resources that are difficult or impossible without the support and backing of the government sector.

Blockchain technology and clean energy are closely related and can jointly contribute to the development of clean energy. For example, blockchain serves as a platform for accurately recording and analyzing data related to clean energy production and consumption, and is essential for better resource management and higher efficiency in the clean energy industry.

Also, using blockchain, waste energy produced in renewable energy production systems is transferred directly to other users without the intervention of intermediaries. This is not possible with the help of peer-to-peer mechanisms, and thus provides the industrial mass to establish a greener and more economical system.

On the other hand, using blockchain, clean energy can be converted into exchangeable and tradable symbols. For example, electricity produced from renewable sources such as wind and solar can be recorded as special tokens on the blockchain and made available to consumers, encouraging the use of clean energy and helping to develop a green economy.

Blockchain can help to align different parties in the clean energy supply chain and facilitate the transfer of energy from resources through governance schemes across logics, helping to further exploit renewable energy resources and improve the efficiency of the clean energy system. Blockchain can also be used as a tool for planning and managing clean energy networks.

Recording complete information in the blockchain and using artificial intelligence algorithms helps to optimize the use of energy resources and balance energy in renewable energy networks.<sup>29</sup>

#### 4.3 Blockchain and Green Jobs

Jobs that are related to the production of energy and clean and environmentally friendly products are called green jobs. Now in many countries of the world, education and empowerment of people in the field of environmental protection along with economic development is considered a key and strategic principle, and they consider the implementation of environmental standards to be beneficial to economic activity and industrial development.

Therefore, it seems that creating solutions for the development of a green economy can establish a link between industry and the

environment while controlling environmental crises and the phenomenon of unemployment.<sup>30</sup>

Green jobs reduce energy consumption and produce less and recyclable waste, and accordingly help reduce the costs of many economic enterprises and preserve nature and the environment. The expansion of green jobs, while increasing motivation and improving labor productivity, leads to the development of healthy environments, reducing accidents, and creating more employment.

Blockchain technology and green businesses, or sustainable and environmentally friendly businesses, are directly related to each other and can be effective in the development and growth of this industry. For example, blockchain helps provide transparent and reliable information about green products and services.

By enabling accurate recording of information such as resources used, production methods, and the product's impact on the environment, blockchain technology helps green businesses make better decisions based on accurate and reliable information. Blockchain also acts as a secure system for financial flows in green businesses.

By adopting a blockchain approach to recording and verifying transactions, the risk of fraud and corruption in transactions is reduced and it provides a sustainable way to respect intellectual property rights and improve financial regulations in green transactions. By creating a connected and collaborative network, blockchain helps green businesses leverage technological creativity and innovation to solve environmental problems.<sup>31</sup>

By encouraging creativity and crowdsourcing, blockchain helps green businesses make better progress. Blockchain can ensure that environmental claims related to green products and services are reliable. Effective green brands can have successful sales and marketing and inspire more trust in their customers.

#### 4.4 Blockchain and Green Trade

Blockchain and green trade, or sustainable and environmental trade, are closely related to each other and can be effective in the development and progress of this field. For example, one of the main challenges in green trade is the transparency and reliability of the supply chain. Blockchain facilitates this challenge by allowing the recording and verification of operations and contracts in an immutable and transparent system and helps to ensure the trust of customers and stakeholders in green trade. Using blockchain, it can be ensured that green products and the hundreds of environmental claims related to them are reliably verified.

Recording information related to the production process, product life management and providing relevant documents on the blockchain can help consumers ensure the accuracy of manufacturers' environmental claims.

Blockchain can also be used to provide smart and automated trading in the field of green trade. In the blockchain system, transactions are verified intelligently and automatically, and green trade interactions are carried out through blockchain-based smart

<sup>28</sup> Georgy Avraamov, "Experience of evergreen financing in the field of financial technologies", Russian journal of resources, conservation and recycling, 9, 4(2022), 9.

<sup>29</sup> Zainab Ali Kamal & Rana F. Ghani, "A Proposed hash algorithm to use for blockchain base transaction flow system", Periodicals of Engineering and Natural Sciences (PEN), 9, 4(2021), 6.

<sup>30</sup> Delton B. Chen, "Utility of the Blockchain for Climate Mitigation", Journal of the British Blockchain Association, 1, 1(2018), 7.

<sup>31</sup> . Julie Frizzo-Barker, et al., "Blockchain as a disruptive technology for business: A systematic review", International Journal of Information Management, 51, (2020), 9.

contracts.<sup>32</sup> Blockchain is effective in promoting international trade in the field of green trade and helps to grow international green trade by reducing the costs and time required for international transactions and improving trust and confidence in them. Using blockchain, the security of financial transactions in green trade is improved and the need for traditional financial instruments and banking intermediaries is reduced. Blockchain helps to provide credit and trust in financial transactions in green trade.<sup>33</sup>

## **5. Review of challenges and solutions related to the use of blockchain in the development of the green economy**

This section discusses two of the most important challenges related to the use of blockchain technology in the development of the green economy and the solutions that exist to address these challenges and facilitate the use of blockchain.

### **5.1 Legal and regulatory challenges**

The use of blockchain in the development of the green economy is associated with legal and regulatory challenges. For example, in some countries, laws and regulations related to environmental protection and natural resource management may be ineffective or incomplete, and as a result, the development of blockchain-based projects in these areas may face problems.

In addition, the lack of legal and regulatory standards for recording and transferring information and data in blockchain can prevent the optimal use of this technology in the development of the green economy. To address these challenges, it is necessary to strengthen the relevant laws and regulations and determine appropriate standards for the use of blockchain in the development of the green economy.<sup>34</sup>

### **5.2 Security challenges and protection of intellectual property rights**

The use of blockchain in the development of a green economy requires the protection of intellectual property rights and data security. Given the public and transparent nature of blockchain, sensitive and confidential information may be exposed to unauthorized access.

Also, the security of the blockchain network must be fully guaranteed to prevent cyberattacks and data destruction. Solutions to address these challenges include the use of strong encryption, the use of specific security criteria, and the establishment of strong authentication systems to protect intellectual property rights and sensitive data.<sup>35</sup>

## **5.3 Solutions to address challenges and facilitate the use of blockchain in the development of a green economy**

To address the legal and regulatory challenges associated with the use of blockchain in the development of a green economy, it is necessary to improve the rules and regulations and set appropriate standards for the use of blockchain in this area. Cooperation between international organizations, governments, and industries is essential in establishing appropriate rules and regulations and promoting the use of blockchain in the development of a green economy.

Regarding security challenges and the protection of intellectual property rights, the use of strong encryption, the use of specific security criteria, and the creation of strong authentication systems can help to address these challenges. Also, education and awareness about blockchain security and intellectual property rights can play a significant role in increasing trust and optimal use of this technology in the development of a green economy.<sup>36</sup>

## **6. The approach of international economic law to the role of blockchain technology in the development of a green economy**

International economic law, as a legal approach that examines the rules and regulations governing economic relations between countries, plays a vital role in the development of a green economy and the use of blockchain technology. International economic law is important in determining the international obligations of countries and facilitating cooperation between them in the development of a green economy.

First, international economic law helps to determine the rules and regulations governing the use of blockchain technology in the field of green economy. For example, it can develop rules to protect privacy and protect data security in blockchain. International economic law also determines rules to address conflicts and disputes related to the use of blockchain in the field of green economy.

Second, international economic law helps to determine the international obligations of countries in the field of using blockchain technology in the development of green economy. These obligations can include obligations such as environmental protection, reducing greenhouse gases, managing natural resources optimally, and increasing transparency in green supply chains using blockchain.

Determining the aforementioned obligations helps to increase international cooperation and facilitate the exchange of information and experiences in the field of green economy development.<sup>37</sup>

Third, international economic law has helped facilitate cooperation between countries in the development and use of blockchain technology in the field of green economy, including the exchange of technical knowledge and experiences, the establishment of mechanisms to facilitate trade and investment in the field of green economy development, and the establishment of international cooperation mechanisms in achieving environmental and economic

<sup>32</sup> Shi-Yi Lin, et al., "A survey of application research based on blockchain smart contract", *Wireless Networks*, 28, 2(2022), 14.

<sup>33</sup> . Z. Zheng, S. Xie, H.N. Dai, X. Chen & H. Wang, "An overview of blockchain technology: architecture, consensus, and future trends", *IEEE transactions on big data*, (2017), 387.

<sup>34</sup> Peter Howson, "Distributed degrowth technology: Challenges for blockchain beyond the green economy", *Ecological Economics*, 184, (2021), 8.

<sup>35</sup> Ronny Hauck, "Blockchain, Smart Contracts and Intellectual Property; Using distributed ledger technology to protect, license and enforce intellectual property rights", *Legal Issues in the Digital Age*, 1, 1(2021), 20

<sup>36</sup> M.L. Dorofeev, "Blockchain perspectives in the development of green economy finance", *Vestnik Universiteta*, 5, (2020), 5.

<sup>37</sup> Mobashar Mubarik, et al., "Impact of blockchain technology on green supply chain practices: evidence from emerging economy", *Management of Environmental Quality*, 32, 5(2021), 12

sustainability goals using blockchain.<sup>38</sup> Also, given the multilateral nature of blockchain, there is the possibility of disputes and disparities between individuals and organizations.

International economic law creates a system for resolving international disputes in this field, through which problems and disputes arising in blockchain transactions in the development of the green economy can be resolved fairly and in a timely manner.

By determining the rules and regulations governing the use of blockchain technology and determining the international commitments of countries in the field of green economy development, international economic law contributes to the advancement and facilitation of international cooperation and the optimal use of this technology in the field of green economy, and helps to create an appropriate framework for sustainable development and optimal management of natural resources, promote green trade, and create a green economy.<sup>39</sup>

International economic organizations have generally paid special attention to the role of blockchain in the development of the green economy. From the perspective of international economic organizations, blockchain can act as a technological infrastructure to facilitate financial transactions in the green economy, improve payment and settlement processes, and reduce the costs and time required to carry out transactions.

Also, from the perspective of international economic organizations, blockchain provides accurate traceability and high transparency in the green economy supply chain. Using this technology, raw materials, products, and finished products can be accurately and reliably tracked and fake and fraudulent information can be prevented.

International economic organizations promote green trade using blockchain. This technology acts as a tool to encourage companies and organizations to use green products and services, while increasing transparency and trust in business transactions. From the perspective of international economic organizations, blockchain improves the ability to protect intellectual property.

Blockchain acts as a security infrastructure for registering and maintaining intellectual property rights in the field of green economy and prevents misuse and theft of information. International economic organizations believe that blockchain can act as a tool to facilitate capital attraction in the field of green economy. Using this technology, financial information and performance of companies can be published in a transparent and reliable manner and improve investor confidence.<sup>40</sup>

The United Nations, as an international organization with the aim of promoting sustainable development and environmental protection, can play an important role in promoting the use of blockchain in the development of a green economy.

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<sup>38</sup> Bing Qing Tan, et al., "A Blockchain-Based Framework for Green Logistics in Supply Chains", *Sustainability*, 12, 11(2020), 9.

<sup>39</sup> 9. Ming-li Cui, Tian-tian Feng & Hao-ran Wang, "How can blockchain be integrated into renewable energy? A bibliometric-based analysis", *Energy Strategy Reviews*, 50, (2023), 9.

<sup>40</sup> Claus Dierksmeier & Peter Seele, "Blockchain and business ethics", *Business Ethics: A European Review*, 29, 2(2020), 8

This organization can try to promote this technology globally by creating research and development projects and programs, training and awareness about the use of blockchain in areas such as natural resource management, reducing air and water pollution, and facilitating green trade.

The OECD can also play a significant role in promoting blockchain in the green economy. The OECD can work to create blockchain-related projects and working groups to harness the benefits of this technology to facilitate green trade, improve transparency, and protect the environment. In addition, the OECD has a vital role in analyzing and assessing the legal and regulatory challenges and benefits of using blockchain in developing a green economy.

## Conclusion

Blockchain technology has a special place in international economic law. As a secure and decentralized technology infrastructure, this technology is effective in various cases from international trade to supply chain management and facilitating electronic commerce. Blockchain technology is effective in various aspects of international economic law. Blockchain technology, using cryptographic technology, provides the possibility of preserving intellectual and material property rights.

Also, using blockchain, it is possible to carry out secure and transparent transactions between the parties to international contracts. Blockchain technology, as a new technology, has a significant impact on international financial regulation and international changes in this field.

Since blockchain allows the recording and verification of information using a strong cryptographic algorithm, this technology acts as a powerful tool for increasing security and transparency in legal activities and international changes. In the present era, the development of a green economy has become very important in order to preserve the environment and optimally use natural resources; in this regard, blockchain technology, as a new and innovative technology, provides many capabilities for the development of a green economy; therefore, blockchain technology has a significant impact on the development of a green economy.

Blockchain technology has many capabilities that improve the performance of the green economic system. First, blockchain, as a distributed and transparent system, allows for the recording and tracking of transactions and activities. This increases transparency in the green supply chain and trade related to the green economy. With access to accurate and reliable information, the best decisions can be made regarding the selection of green suppliers, natural resource management, and green trade.

Second, blockchain, as an immutable and unforgeable system, minimizes the possibility of changing and falsifying information. This reduces fraud and breach of contract in the field of green trade and transactions related to the green economy. Also, by using programmable smart contracts based on precise rules and conditions, it is possible to guarantee the correct implementation of contracts and obligations in the field of green economy.

Third, blockchain enables fast and secure transfer of data and information directly and without the need for bank intermediaries, and helps facilitate financial and commercial transactions in the field of green economy. For example, with blockchain, financial transactions related to green trade and investment in green projects can be carried out quickly and securely.

Fourth, blockchain plays a vital role in facilitating green trade and increasing transparency and trust in the green supply chain. Blockchain records and tracks information related to the origin and quality of green products, as well as their production and storage conditions, in a transparent and reliable manner, and helps increase green trade and strengthen trust between stakeholders in this field.

Fifth, blockchain improves natural resource management. For example, by accurately recording and tracking information on the consumption and use of natural resources, they can be managed more accurately and efficiently. Such information can be monitored and reviewed and can help in making decisions related to the conservation and sustainable use of natural resources in the green economy.

Sixth, blockchain technology can create new markets in the green economy. For example, by using blockchain tokens, new financial and commercial markets can be created in the field of green trade and investment in green projects and help increase innovation and economic growth in the field of the green economy.

Seventh, blockchain can reduce the costs associated with transactions and transactions related to the green economy. This leads to increased productivity and reduced waste of resources. Also, by using programmable and automatically executed smart contracts, business processes related to the green economy can be improved; therefore, blockchain technology, with capabilities such as transparency, fraud reduction, fast and secure data transfer, promotion of green trade, improved natural resource management, creation of new markets and innovation, cost reduction and increased productivity, can enhance the performance of green economic systems.

This technology can help facilitate transactions, ensure rights and efficiency of contracts, optimize the use of natural resources and create a sustainable green economy. Given the international nature of blockchain technology and its impacts on the green economy, it is necessary to develop and implement appropriate rules and regulations in international economic law.

These rules and regulations should focus on establishing specific rights and obligations in the use of blockchain technology, protecting personal information and intellectual property rights, and creating a safe and reliable environment for activities related to the green economy.

As a result, the development of blockchain technology and the approach of international economic law towards it can contribute to the development of a green economy and the conservation of natural resources. Achieving this goal requires cooperation between governments, international organizations and industry. It is also necessary to conduct more research on the effects of blockchain technology on the development of the green economy and its legal approaches to achieve greater productivity in this area.

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