Multidisciplinary Applied Research and Innovation Vol. 3 No. 4 (2022) 20-28

MARI

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/mari
e-ISSN :2773-4773

Intelligent Electronic Arbitration: A Blockchain-Based Model

Mohamad Fateh Labanieh*[1], Mohammad Azam Hussain[1], Rohana Abdul Rahman[1], Zainal Amin Ayub[1]

[1]School of Law, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

*Corresponding Author Designation

DOI: https://doi.org/10.30880/mari.2022.03.04.004
Received 06 August 2022; Accepted 01 October 2022; Available online 20 December 2022

Abstract: Blockchain has been regarded as a cornerstone and linchpin of Fourth Industrial Revolution (IR.4.0). Numerous sectors, including healthcare, have examined the use of blockchain technology. In this article, intelligent electronic arbitration (IEA) is an innovative and revolutionary dispute resolution mechanism that integrates artificial intelligence (AI) technologies within electronic arbitration (e-arbitration). The shift towards using the IEA mechanism in resolving commercial disputes is being sparked by the need to ensure sustainability in the practice of arbitration in Malaysia and the pressing necessity to facilitate access to justice during the COVID-19 outbreak or any unstable circumstances. However, using the IEA mechanism is not totally immune to criticisms. Firstly, when a losing party fails to comply with the IEA award, the winning party must undertake the traditional enforcement procedures. This result in further judicial proceedings, unnecessary expenses, and undue time-consuming. Secondly, the parties to IEA are vulnerable to the risk that their sensitive data and information shared during the IEA proceedings are not secure against cyber-attacks. This article introduces the applicability of the blockchain-based model in enhancing and strengthening the implementation of IEA. Therefore, the qualitative research methodology is adopted. Both primary and secondary data are collected using a library-based approach and analysed using critical and analytical approaches. It has been discovered that using IEA in a Blockchain-Based Model promises to clinch the above issues. Particularly, blockchain would eliminate the need to go through a long process to enforce the IEA award since such award would be self-enforced and without the intervention of the Malaysian High Courts. Additionally, the secured nature of blockchain would dramatically minimise the risk of cyber-attacks deriving from conducting the IEA procedures on the cyber-space. Finally, future research might quantitatively analyse the impact of using the blockchain-based model in enhancing and strengthening the implementation of the IEA mechanism.

Keywords: Artificial Intelligent Arbitration; Blockchain; Covid-19, Dispute Resolution, E-arbitration.

Corresponding author: m.fateh.labanieh@uum.edu.my

1. Introduction

Undoubtedly, blockchain is a disruptive technology appearing during the Fourth Industrial Revolution (IR4.0) and has introduced radical and revolutionary shifts in several industries [1], including but not limited to healthcare [2], banking [3], smart cities [4], and internet of things (IoT) [5]. In the context of this article, blockchain has become one of the hot topics discussed in the context of arbitration [6]. The history of blockchain can be traced back to 1976 when an important article on "New Directions in Cryptography" highlighted and explained the concept of "distributed ledger". However, Satoshi Nakamoto is the direct inventor of blockchain technology. In 2008, he explained the online payment between two parties, sources, or organisations without relying on a third-party.In the following year, Satoshi Nakamoto implemented the first blockchain system based on bitcoin (digital cryptocurrency). In 2022, bitcoin is the first digital cryptocurrency capitalising on the market [7].

The features of blockchain technology include the resistance to cyber-attacks, decentralisation, and maintaining the privacy of the users [3]. Also, it is essential to note that blockchain can be utilised in a decentralised (the blockchain system is owned and controlled by all users) or centralised (the blockchain system is owned and controlled by a single entity) mode [9]. Blockchain can be defined as a distributed digital database in which it is organised as a list of ordered blocks, where the committed blocks are unchangeable [10]. Also, blockchain is a database technology aims to secure and facilitate transactions of the cryptocurrency [11]. Blockchain is divided into four primary types which are public, private, consortium and hybrid blockchain [12].

In the context of this article, the COVID-19 pandemic has increased the preference and interest in using a smart, intelligent, and modern dispute resolution mechanism, especially the IEA mechanism. This is because the IEA mechanism incorporates AI tools and technologies into e-arbitration. This means that the entire IEA proceedings take place in the cyber-space environment and are conducted intelligently and smartly using AI tools and technologies.

However, IEA is still not a future-proofing dispute resolution mechanism because there are several rooms for improvement. Specifically, the use of blockchain technology in the context of IEA is considered alien. In other words, IEA does not take advantage of disruptive technologies, especially blockchain technology. For instance, blockchain technology might potentially help in securing the entire IEA proceedings (the exchange of documents and sensitive information among the participants in the IEA mechanism and during the IEA proceedings) due to the "principle of cryptography". This, in turn, means that the vulnerability to cyber-attacks and cyber-threats would be eliminated or at least reduced dramatically. Moreover, blockchain technology might also speed up and facilitate the enforcement of the IEA award without bearing additional expenses and undue time-consuming.

Consequently, this insight article offers the applicability of the blockchain-based model in enhancing and strengthening the implementation of IEA in Malaysia. The rationale behind is driven by the need to firstly augment the effectiveness of the IEA mechanism, especially in terms of boosting the level of cyber-security and expediting the process of enforcing the IEA award; secondly, to modernise the practice of arbitration in Malaysia and align it with IR.4.0. This brings two advantages; firstly, it would provide better access to justice to the domestic and international disputing parties. Secondly, it would make it possible for the Malaysian arbitration industry to adhere to contemporary practices and move forward in line with IR.4.0.

2. Methodology

This article is based on qualitative research methodology because such methodology serves to simultaneously develop theory and collect and analyse data [13]. This enables the researchers to assemble a precise description and analysis of the reality of blockchain technology and understand how it could bring additional value to the IEA mechanism and strengthen its advantages. Moreover, the instrument utilised for data collection was the library-based approach. The data were collected from

primary sources, such as Laws (Arbitration Act 2005 (Act 646), Digital Signature Act 1997 (Act 562), and Rules of Court 2012, and secondary sources, such as books, magazine articles, scientific articles, web pages, and newspaper articles on the subject. Finally, both types of data were analysed using critical and analytical approaches. To illustrate further, the analytical approach helped in examining the use of blockchain in the IEA mechanism. Besides, critical approach was adopted because it enables the researcher to analyse the current laws and Acts deeply and comprehensively. **Figure 1** explains the Research Methodology for clear understanding.

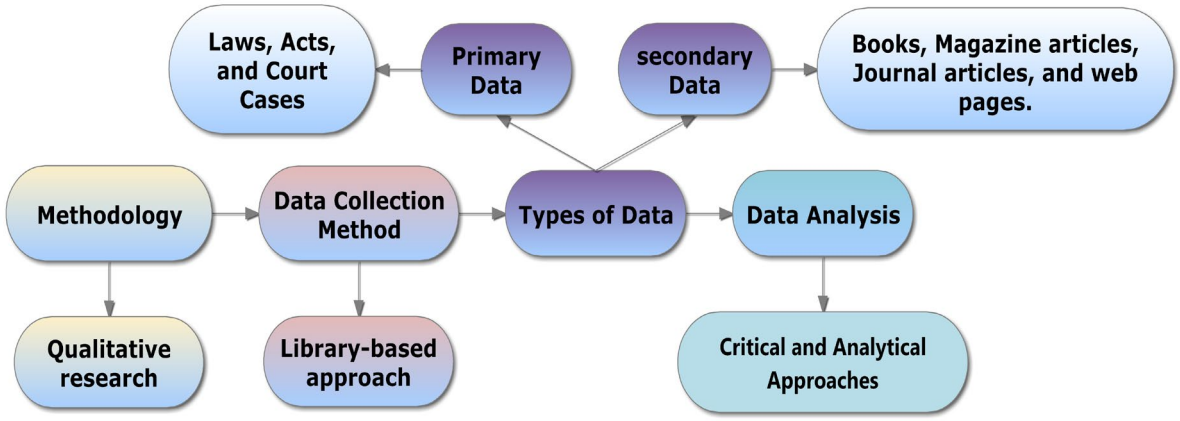

Figure 1: Research Methodology

3. Results and Discussions

Recently, data protection and cyber-security are the main issues that dominate discussions among the stakeholders of the arbitration community not only at the domestic level [14] but also at the international level. This is due to the several incidents of cyber-breaches that have taken place in the case of *Libananco Holdings Co. Limited v. Republic of Turkey*, ICSID Case No. ARB/06/8 [15] and *the Republic of Philippines v. The People's Republic of China*, Permanent Court of Arbitration (PCA) Case No. 2013–19 [16].

IEA mechanism operates and is based on the underlying "principles of confidentiality", and cloud computing becomes the *de-facto* norm for storing the data and documents provided by the parties to IEA, providing high performance and cost-effectiveness. Therefore, these data and documents are deemed confidential and sensitive in all rational sense. However, cloud computing has no "sufficient security protocols that can avert significant cyber-attacks in the future" [17]. Therefore, blockchain technology has appeared as the awaited savior. In other words, blockchain technology has been considered an adequate means to ensure the protection of data transfer, storage, and distribution from unauthorised alteration, access, and modification [18] [19] during the IEA proceedings. This is because of its underlying attributes of operational resilience, data encryption, and immutability.

Based on the above, the following proposes a procedural guideline[1] explaining the steps for the blockchain-based model in the context of the IEA mechanism. Specifically, it shows two things. Firstly, the way how blockchain technology can be integrated into the IEA mechanism in order to secure the submission and exchange of documents and evidence between the participants, such as parties and arbitrators, during the IEA proceedings. Secondly, the way how IEA award can be automatically enforced without the interference of a third party, such as the Malaysian High Court. From now on, this procedural guideline will be referred to as "BC-IEA-platform".

[1] It can be adopted by Asian International Arbitration Centre (AIAC).

BC-IEA-platform is based on a "private permissioned blockchain"[2] for several reasons. Firstly, it ensures the highest level of confidentiality for the participants (parties and arbitrators) in the IEA proceedings. Secondly, it guarantees that only specific and certain participants have control over the IEA proceedings, such as the arbitral center Asian International Arbitration Centre (AIAC) and/or the arbitral panel.[3] Thirdly, the private blockchain is faster in terms of verifying and recording the data or information in a block than the public blockchain. This is because only specific users are permitted to access the private blockchain. So, a private blockchain is "more secure than public blockchains as it involves more access control" [8].

Furthermore, it is important to indicate that there are several forms and types of encryption are performed and executed at different levels in the proposed BC-IEA-platform.[4] This furnishes protection against cyber-attacks and cyber-threats and consequently mitigates the hazard of revealing and leaking sensitive and confidential data. Also, the BC-IEA-platform is augmented with "Computational Intelligence" because of its ability to improve the security of the BC-IEA platform against cyber-attacks by constantly monitoring blocks and detecting when the BC-IEA platform is under cyber-attacks—resulting that the privacy of the data and information stored on the BC-IEA platform will be enhanced.

Figure 2 explains how blockchain technology can be integrated into the IEA mechanism in order to enhance and strengthen the implementation of the IEA mechanism in Malaysia, especially in terms of securing the submission and exchange of documents and evidence between the participants, such as parties and arbitrators in IEA mechanism.

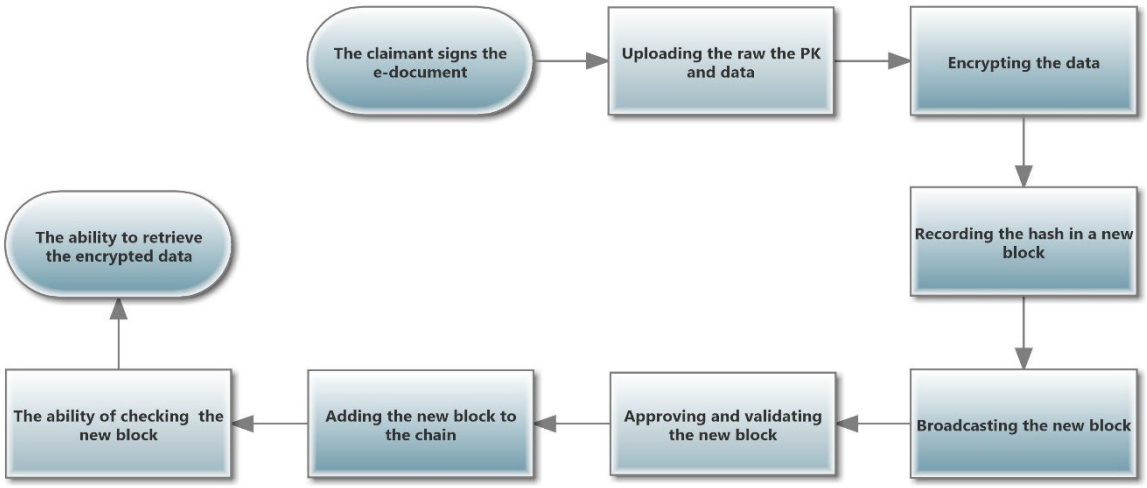

Figure 2: Blockchain model to exchange data between participants in IEA mechanism

[2] It is similar to "organisations intranet pages, where information is only shared and exchanged internally with those who have been authorised to access the site".

[3] It restricts access to the network to specific and certain users, such as parties and arbitrators, and the data stored in BA-IEA platform are privately accessible and readable to the specific participants, such as parties and arbitrators. Also, the identities of the users, such as parties and arbitrators, of a permissioned blockchain are known to the other users of permissioned blockchain, such as BC-IEA platform.

[4] The blocks and linked lists in the BC-IEA platform will be encrypted by utilising cryptographic algorithms, especially, "asymmetric key algorithm", such as digital signature, and "hash functions", such as Secure Hash Algorithm (SHA) 256-bit.

Step 1. Before uploading the claimant's electronic document (e-document), he/she has to sign such document digitally[5] using his/her private key. Using a digital signature is to prove that the e-document was submitted and signed by the right person (claimant).

Step 2. The claimant uploads the raw data (signed e-document) and his/her public key to a BC-IEA-platform which will stores the raw data (signed e-document) in Distributed Storage Systems (DSS)[6], such as Microsoft Azure, Amazon S3, and Google Cloud. This would help in solving the difficulty of storing and saving the original e-document in the blockchain due to the restricted storage space.

Step 3. The BC-IEA-platform encrypts the raw data (the signed e-document) using a hash algorithm function[7], such as Secure Hash Algorithm (SHA) 256-bit length.[8] This proves that the raw data (the signed e-document) exists and, it is genuine.

Step 4. The hash of the encrypted e-document will be stored and recorded in a new block[9] in the BC-IEA platform.

Step 5. A new block will be broadcasted to the nodes,[10] such as the authorised nodes by AIAC.

Step 6. The nodes approve and validate a new block, represented in the claimant's submission. This is made by verifying and authenticating that the submission is made by the right person (claimant) and that public key belongs to him/her.

Step 7. Upon approval, a new block will be added to the existing chain in BC-IEA platform, which is unalterable, permanent, and immutable.[11]

Step 8. The other participants, such as defendants and arbitrators, in the IEA mechanism, can see and check a new block in the BC-IEA platform.

Step 9. The participants will be able to retrieve the encrypted signed e-document to its original form. This occurs when the interested participants download the encrypted signed e-document and decrypted it using the public key shared by the claimant and included in the block stored in the BC-IEA-platform.

Side by side, enforcing the IEA award is a time-consuming and waste of money procedure because the winning party seeking to enforce his/her the IEA award would face real challenges in this regard. He/She needs to follow the traditional procedures to get his/her IEA award recognised and

[5] The digital signature shall comply with section 62 of the Digital Signature Act 1997 (Act 562).
[6] A distributed storage system is the infrastructure that can split data across multiple physical servers, and often across more than one data center. It typically takes the form of a cluster of storage units, with a mechanism for data synchronization and coordination between cluster nodes.
[7] A hash function takes a group of characters (called a key) and maps it to a value of a certain length (called a hash value or hash). The hash value is representative of the original string of characters, but is usually smaller than the original. In short, hashing is used in encryption.
[8] It is commonly used for cryptographic security.
[9] The new block contains the data, such as details about the claimant, his/her public key, the hashing, and the timestamp of the block creation.
[10] In computer science, the term "node" simply means a device that plays a part in a larger network. In the context of blockchain, a node is one of the computers that run the blockchain's software to validate and store the complete history of transactions on the network.
[11] If there is suspicion regarding the data recorded in the block, for instance, modified or altered, AIAC can hash the raw data, such as the encrypted signed e-document, and compare it to the hash stored in the BC-IEA platform. In other words, the input change would cause a totally new hash that differs from the original document, such as the encrypted signed e-document.

enforced. Specifically, He/She needs to physically present before the Malaysian High court and in-person submit the required documents. However, using a smart contract would offer considerable advantages not only to the winning party because there is no place for further judicial proceedings causing unnecessary expenses and undue delay, but also to the Malaysian legal system because the workload on the Malaysian High Court will be mitigated in terms of enforcing the IEA award.

Specifically, a smart contract is based on blockchain technology [20] and was suggested by Nick Szabo (an American researcher of digital currencies and computer scientist) in 1996 [21]. The smart contract is a "self-automated computer program" where its terms and conditions are embedded into "lines of code". Therefore, it can be self-enforced and self-executed without the need for any censorship or interference from a third party [22], such as the Malaysian High Court. This is because the smart contract is based on the "pre-programmed conditions" or "If-then approach". Meaning that if the losing party in the IEA mechanism does not challenge the IEA award within a specific timeframe, as indicated in Rules of Court 2012, the smart contract represented in the "IEA award" will be executed and enforced automatically without the need for following the traditional processes of enforcement. The following illustrates how the IEA award can be automatically enforced in BC-IEA platform without the interference of a third party, such as the Malaysian High Court. Each step explained and further presented in **Figure 3** for a clear understanding.

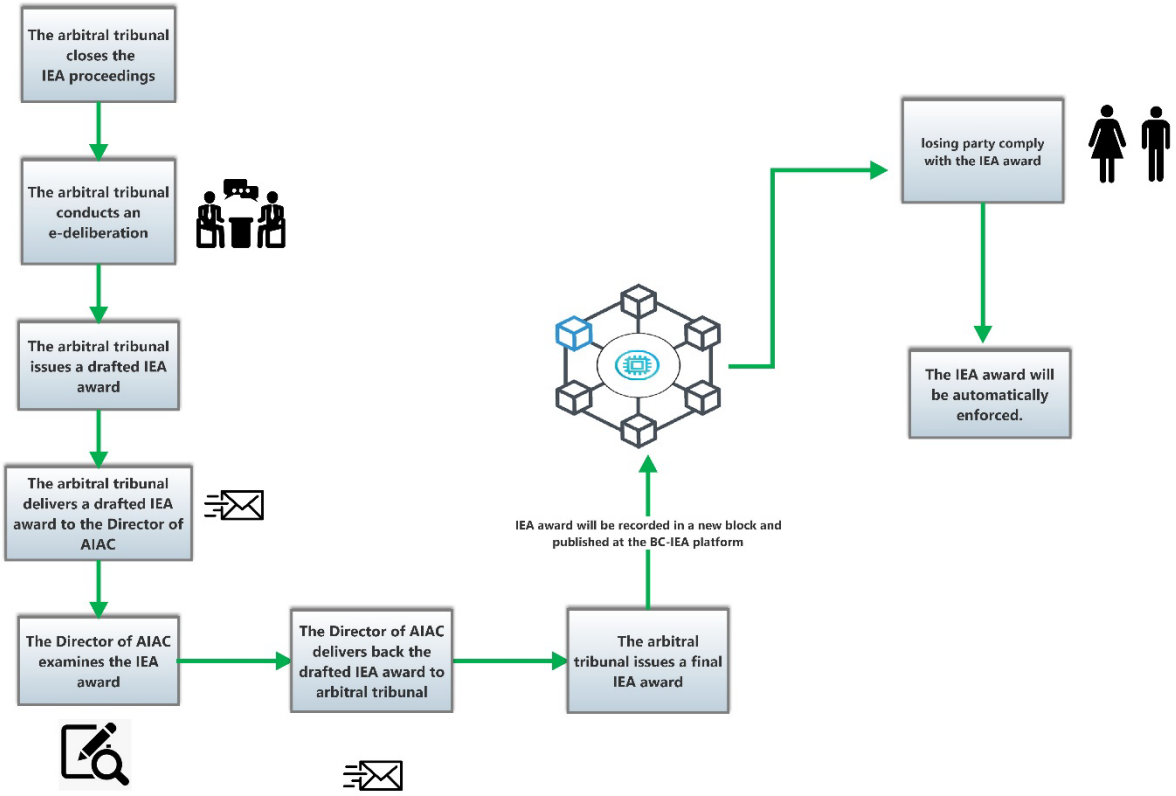

Figure 3: Using Blockchain-based model to enforce the IEA award.

Step 1. The arbitral tribunal closes the IEA proceedings. This happens after giving the disputing parties a full opportunity to present their case and submit all their arguments, claims, and evidence.

Step 2. The arbitral tribunal conducts an e-deliberation session on the virtual case room in the BC-IEA platform.[12]

[12] The session of e-deliberation should be confidential and private.

Step 3. The arbitral tribunal issues a drafted IEA award.

Step 4. The arbitral tribunal electronically delivers (e-deliver) a drafted IEA award to the Director of AIAC.

Step 5. The Director of AIAC examines the IEA award to ensure that the arbitral tribunal has considered all the matters submitted by the parties. In this case, the Director of AIAC will not examine the facts of the IEA award.

Step 6. After approval, the Director of AIAC e-delivers the drafted IEA award to the arbitral tribunal.

Step 7. The arbitral panel issues the IEA award, represented in the form of the smart contract.

Step 8. The IEA award, represented in the form of the smart contract, will be recorded in a new block and published on the BC-IEA platform.

Step 9. The losing party complies with the IEA award and does not submit a request to challenge the IEA award within the specific timeframe to the Malaysian High Court.

Step 10. The IEA award, represented in the form of the smart contract, will be automatically enforced. For instance, the arbitrator fees will be deducted from the losing party's e-wallet and transferred to the e-wallet of AIAC. Similarly, the claim of dispute will be deducted from the losing party's e-wallet and transferred to the winning party's e-wallet.[13]

4. Conclusion

Currently, the developed countries, including Malaysia, have realised the extensive technological development and evolution that has been brought by the IR.4.0. IEA mechanism has the capability to provide better access to justice to the domestic and international disputants and enhance the quality of life of the human beings, such as the human arbitrators, through replacing laborious tasks and processes with automation and AI. This would increase job satisfaction.

However, using the IEA mechanism is a double-edged sword because of two (2) main reasons. Firstly, the disputing parties are still vulnerable to the risk that the sensitive data and information that they shared during the IEA proceedings would be leaked or hijacked by the cyber-criminals. Secondly, the enforcement of the IEA award is not an easy-going process because the winning party needs to go through further traditional proceedings in order to recognise and enforce his/her IEA award. For instance, he/she needs to present before the Malaysian High Courts, and in-person submit the required documents in this regard.

Based on the above, it is discovered that blockchain technology has the ability to curb the above-mentioned challenges facing the successful implementation of the IEA mechanism in Malaysia. Therefore, the Malaysian authority, including AIAC, need to keep moving forward and invest more in blockchain technology. This would ultimately have a positive impact on the arbitration industry in Malaysia. Firstly, it would augment the effectiveness of the IEA mechanism, especially in terms of boosting the level of cyber-security and expediting the process of enforcing the IEA award. Secondly, it would alleviate the burden on the arbitration system and improve access to justice. Thirdly, it would make it possible for the Malaysian arbitration industry to adhere to contemporary practices and move forward in line with IR.4.0. This would activate the arbitration business and help in increasing the number of registered arbitration cases at the AIAC. Fourthly, it would enable Malaysia to satisfy its obligation to sustainable development goals (SDGs) of the United Nations (UN), especially, in terms

[13] The deducted money here should be in the form of cryptocurrency, such as bitcoin.

of supporting human well-being. For instance, the disputing parties who would be able to access justice efficiently during the COVID-19 outbreak and any unstable scenario. Ultimately, it is worth noting that future research might quantitatively analyse the impact of using the blockchain-based model in enhancing and strengthening the implementation of the IEA mechanism.

Acknowledgment

The authors would like to thank School of Law, Universiti Utara Malaysia for providing research assistance to carry out this innovation project.

References

[1] Kumar, S., et al., "Artificial Intelligence and Blockchain Integration in Business: Trends from a Bibliometric-Content Analysis," Information Systems Frontiers, vol. 5, no. 3, March 2022. [Online]. Available: https://doi.org/10.1007/s10796-022-10279-0

[2] X. Yue, et al., "Healthcare Data Gateways: Found Healthcare Intelligence on Blockchain with Novel Privacy Risk Control," Journal of Medical Systems, vol. 40, no. 10, August 2016. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/27565509/

[3] L. Cocco, et al., "Banking on Blockchain: Costs Savings Thanks to the Blockchain Technology," MDPI Future Internet, vol. 9, no. 3, June 2017. [Online]. Available: https://www.mdpi.com/1999-5903/9/3/25

[4] A. S. Patil, et al., "A Framework for Blockchain Based Secure Smart Green House Farming," Springer, Advances in Computer Science and Ubiquitous Computing, Decmber 2017.

[5] O. Novo, "Blockchain Meets IoT: An Architecture for Scalable Access Management in IoT," IEEE Internet Things Journal, vol. 5, no. 2, April 2018. [Online]. Available: https://www.ericsson.com/4a4d48/assets/local/reports-papers/research-papers/blockchain-meets-iot_an_architecture_for_scalable_access_management_in_iot.pdf

[6] J. Nevena, "2018 in Review: Blockchain Technology and Arbitration," *Kluwer Arbitration Blog*. January 27, 2019. [Online]. Available: http://arbitrationblog.kluwerarbitration.com/2019/01/27/2018-in-review-blockchain-technology-and-arbitration/. [Accessed July 20, 2022].

[7] Consultancy, "Determining the real market capitalization of crypto assets," *Consultancy*. February 08, 2022. [Online]. Available: https://www.consultancy-me.com/news/4692/determining-the-real-market-capitalization-of-crypto-assets. [Accessed July 12, 2022].

[8] C. Stouffer, "What is blockchain security? An overview," *Norton*, [Online]. Availablehttps://us.norton.com/internetsecurity-privacy blockchain security.html#:~:text=That's%20because%20only%20permitted%20users,as%20a%20members%2Donly%20club [Accessed July 12, 2022].

[9] S. Surajdeep, "Potential Use Cases of Blockchain Technology for Cybersecurity," IT Business Edge. July 16, 2021. [Online]. Available: https://www.itbusinessedge.com/security/potential-use-cases-of-blockchain-technology-for-cybersecurity/#:~:text=A%20blockchain%20can%20be%20used, all%20users%20have%20collective%20control. [Accessed July 12, 2022].

[10] F. Casino, "Analysis of Software Requirements Engineering Exercises in a Global Virtual Team Setup," Journal of Global Information Management, vol 13, no. 2. April 2005 [Online]. Available: https://doi.org/10.4018/jgim.2005040102

[11] S. Ingalls, "The State of Blockchain Applications in Cybersecurity," *eSecurity Planet*. July 28, 2021. [Online]. Available: https://www.esecurityplanet.com/applications/cybersecurity-blockchain-applications/. [Accessed July 12, 2022].

[12] Data Flair Training, "Types of Blockchains – Decide which one is better for your Investment Needs," *Data Flair Training*. Jule 5, 2022. [Online]. Available: https://data-flair.training/blogs/types-of-blockchain/. [Accessed July 12, 2022].

[13] J. A. Maxwell and D. M. Loomis, "Mixed method design: An alternative approach," In Handbook of Mixed Methods in Social and Behavioral Research, A. Tashakkori and C. Teddle Eds, Thousand Oaks, CA: Sage, 2003, pp. 241-272.

[14] M. F. Labanieh, M. A. Hussain, and N. Mahdzir, "Improving the Quality and Safety Standard in Implementing E-Arbitration in Resolving Islamic Banking Disputes in Malaysia," International Journal of Supply Chain Management, vol. 9, no. 4, 2020. [Online]. Available: https://oj s.excelingtech.co.uk/index.php/IJSCM/article/view/5168.

[15] Italaw, "Libananco Holdings Co. Limited v. Republic of Turkey, ICSID Case No. ARB/06/8," Italaw. [Online]. Available: https://www.italaw.com/cases/626. [Accessed July 12, 2022].

[16] T. L. A. Nguyen, "Award of the Republic of Philippines v. the People's Republic of China: Legal Implications on the South China Sea Disputes," in Asian Yearbook of International Law, S. Lee and H. E. Lee, eds, Dutch: Brill, 2015, pp. 34-48.

[17] Deloitte, "Blockchain to blockchains: Broad adoption and integration enter the realm of the possible," *Deloitte*. December 05, 2017. [Online]. Available: https://www2.deloitte.com/us/en/insight s/focus/tech-trends/2018/blockchain-integration-smart-contracts.html?id=us:2ps:3gl:confidence:eng:c ons:120617:em:dup1157:f5ByYZ1E:1083233419:244804533104:b:RLSA_Tech_Trends: [Accessed July 12, 2022].

[18] V. Rajiwade, "Blockchain Cybersecurity," *Cyberyug*, November 30, 2021. [Online]. Available: https://www.cyberyug.com/post/blockchain-cybersecurity: [Accessed July 12, 2022].

[19] A. R. Tiwary and R. Sharma, "Employability of Blockchain Technology in International Commercial Arbitration," *Rgnulcadr*. January 11, 2021. [Online]. Available: https://rgnulcadr.com/20 21/01/11/employability-of-blockchain-technology-in-international-commercial-arbitration/ [Accessed July 12, 2022].

[20] CFI Team, "Smart Contract," *Corporate Finance Institute*. January 19, 2022. [Online]. Available: https://corporatefinanceinstitute.com/resources/knowledge/deals/smart-contract/ [Accessed July 12, 2022].

[21] N. Szabo, "Smart Contracts: Building Blocks for Digital Markets," Universiteit van Amsterdam, 1996. Available: https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDRO M/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html [Accessed July 12, 2022].

[22] S. Mahawar, "Smart contracts: implementation, application, benefits and limitation," *Blog Ipleaders*, July 6, 2022. Available: https://blog.ipleaders.in/smart-contracts-implementation-application-benefits-and-limitation/ [Accessed July 12, 2022].