

Industrial Halal Blockchain: The Great Potential of The Digital Economy in Indonesia

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Article history:

Received August 4, 2022

Revised January 12, 2023

Accepted March 2, 2023

Available online on April 1, 2023

Keywords:

halal industry, blockchain, digital economy

Paper type: Research paper

Please cite this article [Turabian of style 8th edition]: Asnawi, Nur, Moch Mahsun, and Nevi Danila. "Industrial Halal Blockchain: The Great Potential of The Digital Economy in Indonesia". *IQTISHODUNA: Jurnal Ekonomi Islam* 12, no. 1 (April 1, 2023): 223–244. Accessed April 1, 2023.

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ABSTRACT

The development of the digital economy is an essential part of Indonesia's G20 presidency. We evaluate the digital economy, focusing on blockchain adoption in the financial services industry and buying and selling transactions. Even then, there are still doubts regarding system transformation, information security, and guarantee of traceability, both in terms of data validation in complying with Islamic principles (halal industry). In this issue, we show that the importance of developing blockchain adoption can be developed in the broader field, especially in responding to deindustrialization on the principles of collaboration in digital transformation that are more inclusive, empowering, complying with sharia principles, and sustainable. This research is critical to know as a basis for consideration by government policies, industry, and entrepreneurs in considerations related to blockchain adoption through supply chain management principles that are standardized with the principles of the halal industry.

Abstrak: Pengembangan ekonomi digital merupakan bagian penting presidensi G20 Indonesia. Kami mengevaluasi terkait ekonomi digital yang selama ini berfokus terhadap adopsi blockchain pada industrial layanan keuangan dan transaksi jual beli, itupun masih saja diragukan dari sisi transformasi sistem, keamanan informasi dan jaminan keterlacakan baik secara validasi data dalam mematuhi prinsip-prinsip Islam (industri halal). Dari isu tersebut kami menunjukkan bahwa pentingnya pengembangan adopsi blockchain dapat dikembangkan keranah yang lebih luas khususnya dalam merespon deindustrialisasi pada prinsip kolaborasi transformasi digital yang Lebih Inklusif, Memberdayakan, kepatuhan terhadap prinsip syariah dan Berkelanjutan. Penelitian ini penting diketahui sebagai bahan pertimbangan kebijakan

pemerintah, industri, pengusaha dalam bahan pertimbangan terkait adopsi blockchain melalui prinsip-prinsip supply chain manajemen yang distandarisasikan dengan prinsip industri halal.

Kata kunci: industri halal, blockchain, ekonomi digital

INTRODUCTION

Indonesia has been the most active country in discussing digitalization through blockchain since 2020 as a desire to maintain and encourage effectiveness in the payment and financial system¹. The development of blockchain digitalization in Indonesia is very significant, primarily related to the blockchain ecosystem compared to other countries in 2022. Indonesia's G20 (Group of Twenty) presidency also refers to the previous G20 agendas, namely economic digitalization.

This time the G20 refers to the milestones through the Digital Economy Working Group (DEWG)². Government policies are also very wide open in developing the blockchain ecosystem³. Through the Ministry of Communication and Information, the issue of Indonesia's 2021 digital economy connectivity priorities in improving public

services, digital economic inclusion and digital development of MSMEs (micro, small and medium enterprises)⁴, included in the halal industry. The halal industry is a separate focus in terms of strengthening the halal supply chain as an information technology empowerment in Indonesia⁵. This focus shows that perceptions of efficiency, transparency, standardization and platform development and traceability factors for halal products are positive⁶.

However, the potential is still constrained in synchronization between lines, so the blockchain ecosystem in Indonesia has not yet fully reached its potential. This causes the information transformation is still weak in terms of accuracy and data security in general⁷. One of the data security

¹ Arif Budiansyah, "Mengintip Eksistensi Blockchain Di Indonesia Dan Peluangnya," CNBC Indonesia, 2020, <https://www.cnbcindonesia.com/tech/20200227130233-37-140844/mengintip-eksistensi-blockchain-di-indonesia-dan-peluangnya>.

² Nabilah Nur Abiyanti Treviliana Eka Putri, "Transformasi Digital Dalam Agenda G20: Menuju Pembangunan Digital Yang Bermakna Dan Berkelanjutan," in *G20 Di Tengah Perubahan Besar (Momentum Kepemimpinan Global Indonesia)*, ed. Wawan Mas'udi Poppy S. Winarti (Jogjakarta: Gadjah Mada University Press, 2022), 55–73.

³ [3][4]

⁴ Treviliana Eka Putri, "Transformasi Digital Dalam Agenda G20: Menuju Pembangunan Digital Yang Bermakna Dan Berkelanjutan."

⁵ Sucipto Sukoso, Adam Wiryawan, Joni Kusnadi, *Ekosistem Industri Halal, Departemen Ekonomi Dan Keuangan Syariah - Bank Indonesia*, Asep A. Pr (Jakarta: Departemen Ekonomi dan Keuangan Syariah - Bank Indonesia, 2020), <https://doi.org/10.30595/pssh.v5i.420>.

⁶ Milad Dehghani, Anna Popova, and Shahin Gheitanchi, "Factors Impacting Digital Transformations of the Food Industry by Adoption of Blockchain Technology," *Journal of Business & Industrial Marketing* 37, no. 9 (January 1, 2022): 1818–34, <https://doi.org/10.1108/JBIM-12-2020-0540>.

⁷ Dwi Murdaningsih Noer Qomariah Kusumawardhani, "Mengenal Dunia

that is meant is security which causes supply and demand to sometimes be unreliable so that at certain times there will be scarcity and price volatility (risk-hedging) for halal products⁸.

In system/business design, this weakness also impacts Bank Indonesia's policy, which prohibits the application of blockchain technology from using blockchain in digital/virtual money (cryptocurrency). Because it has a dangerous impact on the financial security system, monetary stability, and payment system in Indonesia⁹. In fact, from the technology side of the blockchain system, there has been significant growth in investment and interest in blockchain. Companies in various sectors have developed blockchain proof of concept¹⁰. Both usage, payment transactions, and the supply chain are the most promising [10]. Supply chain management also

helps reduce transaction costs through a transaction automation model with the help of blockchain technology¹¹. Including having a good and significant impact on the Halal supply chain's performance and the business's competitiveness¹².

While the concept of business architecture and blockchain technology blueprints still require serious attention to adjust to the quality required by the organization in an integrative way. Blockchain technology is still limited to an adoption model whose nature poses obstacles, challenges, and factors in blockchain utilization solutions' cost and economic feasibility¹³. This gives rise to various governance concepts, especially in realizing the form of a balance of data and information¹⁴, especially regarding

Blockchain Di Indonesia," *republika.co.id*, 2021, <https://www.republika.co.id/berita/qtj9p368/mengenal-dunia-blockchain-di-indonesia>.

⁸ Sukoso, Adam Wiryawan, Joni Kusnadi, *Ekosistem Industri Halal*.

⁹ Asosiasi Indonesia Blockchain, "Perkembangan Teknologi Blockchain Dan Prospek Crypto Asset Di Indonesia," Indonesia Banking School, 2022, <http://ibs.ac.id/en/perkembangan-teknologi-blockchain-dan-prospek-crypto-asset-di-indonesia-2/>.

¹⁰ Chandan Kumar Tiwari and Abhinav Pal, "Using Blockchain for Global Governance: Past, Present and Future," *South Asian Journal of Business Studies* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/SAJBS-07-2022-0252>.

¹¹ Andrew Ebekozi, Clinton Aigbavboa, and Mohamad Shaharudin Samsurijan, "An Appraisal of Blockchain Technology Relevance in the 21st Century Nigerian Construction Industry: Perspective from the Built Environment Professionals," *Journal of Global Operations and Strategic Sourcing* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/JGOSS-01-2022-0005>.

¹² Ratih Hendayani and Yudi Fernando, "Adoption of Blockchain Technology to Improve Halal Supply Chain Performance and Competitiveness," *Journal of Islamic Marketing* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/JIMA-02-2022-0050>.

¹³ Nitin Gaur, "Blockchain Challenges in Adoption," *Managerial Finance* 46, no. 6 (January 1, 2020): 849–58, <https://doi.org/10.1108/MF-07-2019-0328>.

¹⁴ Rosanna Spanò et al., "Blockchain in Accounting, Accountability and Assurance: An Overview," *Accounting, Auditing & Accountability Journal* 35, no. 7 (January 1,

supply chain functions to be applied to the blockchain system¹⁵.

Even though the principles of supply chain management have been oriented towards sustainable development, especially from the global economic growth sector¹⁶, and must be addressed to develop a highly efficient, robust and secure quality management framework using blockchain technology¹⁷. This is actually what developed countries have done as a form of sustainable economic development¹⁸. Through the G20 Indonesia forum, Indonesia

has the opportunity for the world to collectively seek to realize policies that can accelerate global economic recovery in an inclusive manner¹⁹.

Indonesia's G20 presidency aims for a sustainable global economic recovery with the theme "recover together, recover stronger"²⁰. This is a real thing for Indonesia, especially in relation to macroeconomic policies and a sound financial system that is very much needed. In terms of the financial sector, it is also expanding globally. This anticipation is also carried out through reducing risk and optimizing digitalization oriented towards a fast, easy, inexpensive and, of course, safe use of information technology, one of which is the monitoring of crypto assets (blockchain-based)²¹.

Another sector related to the focus of Indonesia's G20 concerning digitalization. This G20 brings up the issue of the digital economy and the

2022): 1493–1506,
<https://doi.org/10.1108/AAAJ-06-2022-5850>.

¹⁵ Dong Xu et al., "Leveraging Digital and Relational Governance Mechanisms in Developing Trusting Supply Chain Relationships: The Interplay between Blockchain and Norm of Solidarity," *International Journal of Operations & Production Management* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/IJOPM-02-2022-0122>.

¹⁶ Simon Fernandez-Vazquez et al., "Blockchain in Sustainable Supply Chain Management: An Application of the Analytical Hierarchical Process (AHP) Methodology," *Business Process Management Journal* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/BPMJ-11-2021-0750>.

¹⁷ Raja Wasim Ahmad et al., "Integrating Lean Six Sigma with Blockchain Technology for Quality Management – a Scoping Review of Current Trends and Future Prospects," *The TQM Journal* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/TQM-06-2022-0181>.

¹⁸ Treviliana Eka Putri, "Transformasi Digital Dalam Agenda G20: Menuju Pembangunan Digital Yang Bermakna Dan Berkelanjutan."

¹⁹ Hadijah Alaydrus, "Apa Itu G20? Berikut Sejarah, Agenda, Dan Manfaat Untuk Indonesia," *bisnis.com*, 2022, [https://ekonomi.bisnis.com/read/20220208/9/1497880/apa-itu-g20-berikut-sejarah-agenda-dan-manfaat-untuk-indonesia#:~:text=G20 merupakan kepanjangan dari Group of Twenty. G20,persen perdagangan global%2C dan 80 persen PDB dunia](https://ekonomi.bisnis.com/read/20220208/9/1497880/apa-itu-g20-berikut-sejarah-agenda-dan-manfaat-untuk-indonesia#:~:text=G20%20merupakan%20kepanjangan%20dari%20Group%20of%20Twenty%20G20,persen%20perdagangan%20global%20dan%2080%20persen%20PDB%20dunia).

²⁰ Ministry of Communications and Informatics of the Republic of Indonesia, "ABOUT THE G20," *g20.org*, 2022, <https://www.g20.org/about-the-g20/#about>.

²¹ Widya Aprilina Sinaga, "Presidensi G-20, Pulihkan Perekonomian Indonesia," *Kementerian Keuangan Republik Indonesia*, 2022, <https://www.djkn.kemenkeu.go.id/artikel/baca/14784/Presidensi-G-20-Pulihkan-Perekonomian-Indonesia.html>.

acceleration of SMEs into the digital ecosystem and digital entrepreneurship by increasing digital capabilities into several priority agendas.²² This digitalization demands to balance oneself the form of rapid response with this digitalization revolution. This digital revolution impacts changes in models, perspectives/attitudes, change in the environment and others²³.

This change is also felt in the development of the Islamic economic sector, whose development has become the most promising market size. There is USD 1.37 trillion spent on food and beverages. Globally, developed countries respond by complying with regulations on product halal standardization in order to penetrate the global market. So that this halal concept makes the concept of generalization in the world because actually, this halal concept/principle is also not consumed by Muslims alone²⁴. From here, it is essential to study the halal concept because the halal concept is not only carried out in large-scale product players but also halal guarantees from the side of small and medium businesses also need to

be considered, especially concerning the use of blockchain digitalization as a role in accelerating the digitization of SMEs as expected by the G20 Indonesia.

Blockchain is a supporter of transparency and traceability, reliability and security, automatic contracts/verification, incentives and tokenization proven to have various potential supports for future company/industry performance assessments²⁵, data security and accountability²⁶, including it in decision-making in policy in industry automation²⁷. Decision/policymaking needs to pay attention to its relation to using blockchain technology as a support system. This adoption has been used in global governance, and governments and companies worldwide have applied blockchain technology in various fields that affect the public and other

²² G20.org, "Priority Issues Indonesia's G20 Presidency," Ministry of Communications and Informatics of the Republic of Indonesia, 2022, <https://www.g20.org/g20-presidency-of-indonesia/#priorities>.

²³ Nafis Alam, Lokesh Gupta, and Abdolhossein Zamani, *Digitalization and Disruption in the Financial Sector, Fintech and Islamic Finance*, 2019, https://doi.org/10.1007/978-3-030-24666-2_1.

²⁴ Sukoso, Adam Wiryawan, Joni Kusnadi, *Ekosistem Industri Halal*.

²⁵ Tal Yarkoni, "The Generalizability Crisis," *Behavioral and Brain Sciences* 45 (2022), <https://doi.org/10.1017/S0140525X20001685>.

²⁶ Mee San Kiu et al., "Blockchain Integration into Electronic Document Management (EDM) System in Construction Common Data Environment," *Smart and Sustainable Built Environment* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/SASBE-12-2021-0231>.

²⁷ Karthik Bajar et al., "Blockchain Technology: A Catalyst for Reverse Logistics of the Automobile Industry," *Smart and Sustainable Built Environment* ahead-of-p, no. ahead-of-print (January 1, 2022), <https://doi.org/10.1108/SASBE-11-2021-0203>.

stakeholders.²⁸ As well as blockchain technology can help in product quality management control²⁹, although blockchain still has a downside, resulting from the technology's negative environmental and social implications³⁰. This technology also does not mean that it does not experience obstacles. The obstacles are also felt by the government, employers and professional employees³¹.

This research provides input to the government, companies and entrepreneurs related to support in the development of the digital economy, primarily related to modelling, business processes in collaboration with supply chain management principles and blockchain adoption in accelerating digitization as desired by G20 Indonesia.

METHODS

This research is a research study of literacy through an article review that discusses the digital transportation literature of the Indonesian G20 Presidency about blockchain adoption, Halal Industry,

and Halal Industry published in the last 5-7 years (2017–2022). This period was selected due to the opportunity to highlight the evolution of the most recent literature on the topic and allow us to conduct an overall analysis of research trends over time. Papers are submitted if they contain three words (blockchain adoption, Halal Industry, Halal Industry, Indonesian G20 Presidency) in the abstract and the text³². We decided to expand the research study from three keywords because the focus of this paper is still minimal.

All articles are collected from 80% indexed on the Scopus database and the rest of the local studies and related government policies as support. The database helps measure research questions. Innovation (also open innovation) as a process of developing blockchain adoption theory, Halal Industry, Halal Industry, G20 Indonesia Presidency.

RESULT AND DISCUSSION

1. *Digital Economy at G20 Indonesia*

Globalization fosters a chain of new habits and innovations caused by the freedom of entry and exit of products in the distribution process of the global economy. Global opportunities are becoming wider, including the development of manufacturing processes to provide production at the most efficient rates possible and with the same quality

²⁸ Tiwari and Pal, "Using Blockchain for Global Governance: Past, Present and Future."

²⁹ Ahmad et al., "Integrating Lean Six Sigma with Blockchain Technology for Quality Management - a Scoping Review of Current Trends and Future Prospects."

³⁰ Spanò et al., "Blockchain in Accounting, Accountability and Assurance: An Overview."

³¹ Ebekozi, Aigbavboa, and Samsurijan, "An Appraisal of Blockchain Technology Relevance in the 21st Century Nigerian Construction Industry: Perspective from the Built Environment Professionals."

³² James Danandjaja, "Metode Penelitian Kepustakaan," *Antropologi Indonesia*, 2014.

assurance.³³ The Group of Twenty (G20) is a group of countries that offers a gradual system with an open principle and continues to grow. The Group of Twenty (G20) was also formed with a membership composition that has an element of balance between efficiency and representation³⁴. Indonesia is part of the G20 and is the foundation of a country that seeks to adapt product quality standards to the needs of global consumers. Indonesia to get inputs related to its products exported abroad. In addition, Indonesia also has the opportunity for global market distribution, technology transfer and open cooperation. Indonesia has always been vital in maintaining regional stability in the G20 forum³⁵.

Through the G20 Digital Working Group (DEWG), Indonesia also provides aspirations in the form of a more inclusive, empowering, and sustainable digital transformation collaboration[2] as a form of

encouragement to develop the digital economy³⁶. This system requires the involvement of several elements collaborating to make it happen³⁷. In addition, Realizing Opportunities of the 21st Century for All world economic growth is considered to be experiencing a delay and tends to decline due to trade and geopolitical tensions and policy uncertainty³⁸. The IMF (International Monetary Fund) also feels that world income has decreased from year to year due to the impact of global economic changes³⁹.

Indonesia itself uses the development of the digital economy as one of the strategies for economic transformation because people tend to use digital platforms in various sectors. Indonesia's G20 with a shared mission. This potential is to strengthen opportunities for

³³ Alvela Salsabilah Putri, "G20: Mediator Untuk Kemajuan Ekonomi Indonesia," *Jurnal Hubungan Internasional* 13, no. 1 (2020): 53–64; Wiwiek Rukmi Dwi Astuti and Laode Muhamad Fathun, "Diplomasi Ekonomi Indonesia Di Dalam Rezim Ekonomi G20 Pada Masa Pemerintahan Joko Widodo," *Intermestic: Journal of International Studies* 5, no. 1 (2020): 47, <https://doi.org/10.24198/intermestic.v5n1.4>.

³⁴ Wiwiek Rukmi Dwi Astuti, "Kerja Sama G20 Dalam Pemulihan Ekonomi Global Dari COVID-19," *Andalas Journal of International Studies (AJIS)* 9, no. 2 (2020): 131, <https://doi.org/10.25077/ajis.9.2.131-148.2020>.

³⁵ Astuti and Fathun, "Diplomasi Ekonomi Indonesia Di Dalam Rezim Ekonomi G20 Pada Masa Pemerintahan Joko Widodo."

³⁶ Treviliana Eka Putri, "Transformasi Digital Dalam Agenda G20: Menuju Pembangunan Digital Yang Bermakna Dan Berkelanjutan"; Mohammed Ali Berawi, "G20 Presidency of Indonesia: Collective and Inclusive Agendas for World Development," *International Journal of Technology* 13, no. 1 (2022): 1–4, <https://doi.org/10.14716/ijtech.v13i1.5479>; Putri, "G20: Mediator Untuk Kemajuan Ekonomi Indonesia"; Indonesia, "ABOUT THE G20."

³⁷ Indonesia.go.id, "Mendorong Transformasi Digital Berkelanjutan G20," indonesia.go.id - Portal Informasi Indonesia, 2022, <https://indonesia.go.id/kategori/kabar-terkini-g20/4448/mendorong-transformasi-digital-berkelanjutan-g20?lang=1>.

³⁸ Astuti, "Kerja Sama G20 Dalam Pemulihan Ekonomi Global Dari COVID-19."

³⁹ Putri, "G20: Mediator Untuk Kemajuan Ekonomi Indonesia."

accelerating the development of the digital economy⁴⁰. Wiwiek Rukmi Dwi Astuti, in his research, explained that there had been many investment opportunities opened to the development of this digital economy, both in Indonesia itself. The International Finance Corporation (IFC) provides investment opportunities by working to expand trade and working capital financing channels. At the same time, the International Development Association (IDA) focuses on the process of debt relief (debt relief) broadly and evenly for developing countries⁴¹. In such a case, mitigation actions are needed at the national and international levels.

Apart from that, Indonesia became the first Asean country to be trusted as an official partner in organizing the largest manufacturing technology exhibition. Indonesia is experiencing deindustrialization and is one of the 16 countries with the strongest economy in the world⁴².

⁴⁰ "Menko Airlangga: Ekonomi Digital Di Indonesia Tertinggi Di Asia Tenggara," Kementerian Komunikasi dan Informatika Republik Indonesia, 2022, <https://www.kominfo.go.id/content/detail/41127/menko-airlangga-ekonomi-digital-di-indonesia-tertinggi-di-asia-tenggara/0/berita>; Astuti and Fathun, "Diplomasi Ekonomi Indonesia Di Dalam Rezim Ekonomi G20 Pada Masa Pemerintahan Joko Widodo."

⁴¹ Astuti, "Kerja Sama G20 Dalam Pemulihan Ekonomi Global Dari COVID-19."

⁴² "Kontribusi Manufaktur Nasional Capai 20 Persen, RI Duduki Posisi Ke-5 Dunia," Kementerian Industri Republik Indonesia, 2019, <https://www.kemenperin.go.id/artikel/20579/Kontribusi-Manufaktur-Nasional->

This will be an impetus in itself to strengthen complex information technology support, both in the production, distribution and promotion sectors, especially for the development of small and medium enterprises (MSMEs) through business incubators and start-ups to ensure urban economic resilience. This is a strengthening of knowledge sharing and collaboration among stakeholders in an international context, while digital technology is used to manage integrated product life cycles and improve efficient, reliable and sustainable business operations, even Indonesia as part of a global supply chain and In the future, Indonesia will become a hub for automotive manufacturing in the Asian region⁴³.

This is also in line with commitments from countries such as China to promote favourable conditions through greater access. At the same time, Germany ensures all its citizens will be digitally connected by 2025 and welcomes the development of digital infrastructure in low-income countries. Italy's continuous investment in quality digital infrastructure can significantly reduce the digital divide⁴⁴. However, what can be taken as an essential point from these various countries is the digital

Capai-20-Persen,-RI-Duduki-Posisi-Ke-5-Dunia.

⁴³ Berawi, "G20 Presidency of Indonesia: Collective and Inclusive Agendas for World Development."

⁴⁴ Treviliana Eka Putri, "Transformasi Digital Dalam Agenda G20: Menuju Pembangunan Digital Yang Bermakna Dan Berkelanjutan."

divide that occurs in each of these countries. It requires collaboration to make it happen and is not limited to technology or lifestyle alone.⁴⁵ This is a significant thing to respond to the transformation and development of the digital economy in Indonesia. Meanwhile, Rachman formulated that it is important for Indonesia to focus on developing Industry, Innovation and Infrastructure or the availability of infrastructure that supports productive industrialization and assists innovation development for sustainable social welfare⁴⁶.

2 Industrial Halal Blockchain Concept and Adoption

Blockchain organizes, verifies, and distributes information to optimize business processes. Blockchain is becoming a global trend that will significantly impact business continuity going forward⁴⁷. This blockchain can be implemented in Indonesia provided that it is supported by government policies, new regulations regarding blockchain technology, and responses to the impact on the financial system, Bank Indonesia

(B.I.) and the Financial Services Authority (OJK). Of course, with the principle of an integrated, efficient digital payment system, and includes transactions between countries⁴⁸.

In terms of transparency, blockchain technology is very supportive. Anyone can track and access the data shared over this network. Apart from this, blockchain applies data sovereignty, namely the power not to share unnecessary personal data with others. The owner holds full control over the valuable data without intervention from other parties⁴⁹.

Indonesia is the first country in the region to utilize blockchain technology actively. Blockchain itself is a technology based on a decentralized, efficient, and secure peer-to-peer network because it is protected by a strong cryptographic algorithm⁵⁰. One of the emerging

⁴⁵ Indonesia.go.id, "Mendorong Transformasi Digital Berkelanjutan G20."

⁴⁶ Rio Febriannur Rachman, "Optimalisasi Media Digital Berbasis Kemaslahatan Umat Dalam Program Pahlawan Ekonomi Surabaya," *Iqtishoduna* 8, no. 2 (2019): 273–92.

⁴⁷ Untung Rahardja et al., "Penerapan Teknologi Blockchain Sebagai Media Pengamanan Proses Transaksi E-Commerce," *CESS (Journal of Computer Engineering, System and Science)* 5, no. 1 (2020): 28, <https://doi.org/10.24114/cess.v5i1.14893>.

⁴⁸ Riza Aditya Syafri and Azizah Ulfa, "Teknologi Blockchain Dan Potensinya," *Buletin APBN* VI, no. 11 (2021): 7–10, www.puskajianggaran.dpr.go.id.

⁴⁹ Binus.ac.id, "Mengenal Blockchain, Teknologi Yang Diprediksi Paling Berpengaruh Di Masa Depan," Binus University, 2021, <https://binus.ac.id/2021/02/mengenal-blockchain-teknologi-yang-diprediksi-paling-berpengaruh-di-masa-depan/>; Rahardja et al., "Penerapan Teknologi Blockchain Sebagai Media Pengamanan Proses Transaksi E-Commerce."

⁵⁰ Treviliana Eka Putri, "Transformasi Digital Dalam Agenda G20: Menuju Pembangunan Digital Yang Bermakna Dan Berkelanjutan"; Kiu et al., "Blockchain Integration into Electronic Document Management (EDM) System in Construction Common Data Environment"; Shifa Mohd Nor, Mariani Abdul-majid, and Siti Nabihah

innovations is a virtual currency (V.C.) driven by distributed ledger technology using blockchain. This is to maintain and encourage efficiency in the payment system and financial system stability so as to increase stability and improve the economy in Indonesia⁵¹.

Indonesia, at this time, has begun to open the door to the application of blockchain technology. The development is very significant, even including the first to be the most rapid and massive for the implementation of blockchain. Blockchain has also been implemented in addition to financial transactions such as BCA and Q.R. Code Indonesia Standard⁵². Blockchain is also implemented by P.T. Pos Indonesia and has even been applied to the beverage industry, such as coffee, through the EMURGO Traceability Solution application. The application is a breakthrough that provides a real

solution to solve inefficiencies in today's supply chain industry⁵³.

One of the supply chain principles is to maintain the importance of transparency in the product supply chain, including in serving halal products. Halal products do not emphasize good products (*toyib*). It is possible that blockchain as a digital asset can be an essential element for creating justice in the supply chain if used according to the right standards⁵⁴. The supply chain also focuses on handling the transformation of materials from raw to semi-finished or finished products. With the supply chain, each step to another will be protected, especially from the potential for additional materials that are not halal. The supply chain will later guarantee and maintain the halalness of every product to the consumer.

Esrati, "The Role of Blockchain Technology in Enhancing Islamic Social Finance :The Case of Zakah Management in Malaysia" 23, no. 5 (2021): 509–27, <https://doi.org/10.1108/FS-06-2020-0058>.

⁵¹ Budiansyah, "Mengintip Eksistensi Blockchain Di Indonesia Dan Peluangnya"; JAGOAN HOSTING, "Kenali Peluang Blockchain Di Indonesia, Apakah Menguntungkan?," jagoanhosting.com, 2021, <https://www.jagoanhosting.com/blog/kenali-peluang-blockchain-di-indonesia-apakah-menguntungkan/>.

⁵² Binus.ac.id, "Mengenal Blockchain, Teknologi Yang Diprediksi Paling Berpengaruh Di Masa Depan."

⁵³ Arif Budiansyah, "Saat Kopi Yang Kamu Minum Bisa Dilacak Pakai Blockchain," CNBC Indonesia, 2020, <https://www.cnbcindonesia.com/tech/20200406121254-37-150002/saat-kopi-yang-kamu-minum-bisa-dilacak-pakai-blockchain>.

⁵⁴ Rozaimi Abu Samah Mohmood, Halizan, "Blockchain Technology Potential in Halal Industry," Centre For Industry And Community Network, 2021, <https://news.ump.edu.my/industry/blockchain-technology-potential-halal-industry>; Hendayani and Fernando, "Adoption of Blockchain Technology to Improve Halal Supply Chain Performance and Competitiveness"; Sukoso, Adam Wiryawan, Joni Kusnadi, *Ekosistem Industri Halal*; Nuhbatul Basyariah, "Konsep Pariwisata Halal Perspektif Ekonomi Islam," *Youth & Islamic Economic* 2, no. 01s (2021): 1–6.

While the supply chain management council theory of the logistics sector is divided into three: transportation, warehousing, and distribution, what distinguishes the transportation sector, distribution has a marketing element. These three sectors are adopted in Indonesia⁵⁵ As a supporter of halal traceability from upstream to downstream⁵⁶. Even now, the term Logistics 4.0 has emerged, which is logistics integration through digital innovation. Blockchain technology will assist in the presentation of information in each of the detailed processes that occur. Blockchain will provide information on each product transfer transaction between one party and another through accurate and transparent records recorded on the use of blockchain technology. With a blockchain-based digital system, if consumers want to trace transaction history and product halalness, it can be done in a few seconds.

In addition, the blockchain that we use in Indonesia can be connected to blockchain networks in other countries. That way, transactions in the halal industry around the world can be collected passively in one giant platform. With global blockchain networks for the

halal industry, it is elementary for the government to guarantee the availability of halal products for domestic and foreign consumers⁵⁷. In addition, the principle of digitalization in the creative industry must also be in line with the principle of *maqasid al-syar'ah*, which is the concept of protecting the religion, soul, mind, lineage, and property of each member of the community. From this, Islam also upholds the form of Islamic openness in the development of science and technology⁵⁸.

3 The Concept of Potential Digitization of the Indonesian Halal Industry

The halal industry is a framework that facilitates and opens opportunities for various stakeholders to synergize to accelerate the development of Halal Industry SMEs based on a digital ecosystem. Digital Transformation is needed to accelerate national economic recovery and strengthen the economic foundation to support sustainable development. At least, there are 3 (three) expected outcomes, namely increasing efficiency and productivity, creating innovation, and inclusiveness. This digital transformation will later be

⁵⁵ INSIGHT:Buletin Ekonomi Syariah, "Potensi Indonesia Jadi Pusat Logistik Halal Dunia," *Komite Nasional Ekonomi Dan Keuangan Syariah (KNEKS)* (Jakarta, 2020).

⁵⁶ Dini Wahyuni and Nurul Arfidhila, "Traceability Pada Rantai Pasok Pangan Halal: Review Literatur," *Talenta Conference Series: Energy and Engineering (EE) 2*, no. 4 (2019), <https://doi.org/10.32734/ee.v2i4.649>.

⁵⁷ Khaswar Syamsu Arkeman, Yandra, "Blockchain Industri Halal," *republika.id*, 2020, <https://republika.id/posts/8334/blockchain-industri-halal>.

⁵⁸ Rio Febriannur Rachman, "Pengembangan Industri Kreatif Berbasis Media Digital Di Surabaya Dalam Perspektif Islam," *Komunitas 10*, no. 2 (2019): 157–76, <https://doi.org/10.20414/komunitas.v10i2.1227>.

used in 3 scopes, namely in government (digital government), business (digital economy), and society (digital society)⁵⁹. This is also a form of acceleration in digital transformation, whose agenda is 10 years to 2-3 years and is assigned to the Ministry of Communication and Information (Kominfo). This effort is narrowed down to 5: Preparing a Digital Transformation Roadmap, Integrating National Data Centers, Preparing the Needs of Human Resources and Digital Talents and Preparing the required Regulations.⁶⁰

Minister of Communication and Information (Menkominfo) Johnny G. Plate stated in 2021, and the government will take extra steps to maintain and encourage national economic improvement. One step is to carry out transformative infrastructure development to create a capable digital ecosystem⁶¹. Meanwhile, Kadin and the National

Committee for Sharia Economy and Finance (KNEKS) look at the ecosystem side so that synergies can be guaranteed and can be developed into an end-to-end lifestyle for people outside the country.⁶². This is a form of synergy and the principle of benefit between stakeholders. When one Stakeholder helps another, the positive impact can be felt for himself in the form of business growth or strengthening their respective fields by collaborating. This collaboration not only strengthens the Halal Industry SMEs but also strengthens the business or field of each Stakeholder, which in turn expands the Islamic economy and finance in Indonesia⁶³. The following is the ecosystem for the application of industrial halal with the adoption of blockchain technology:

⁵⁹ Hermin Esti Setyowati, "Transformasi Digital Yang Inklusif Turut Percepat Pembangunan Berkelanjutan," Kementerian Koordinator Bidang Perekonomian Republik Indonesia, 2020, <https://ekon.go.id/publikasi/detail/330/tranformasi-digital-yang-inklusif-turut-percepat-pembangunan-berkelanjutan>.

⁶⁰ Mashud Toarik, "Targetkan Transformasi Digital Dalam 3Tahun, Kominfo Gagas 5 Langkah," Kementerian Komunikasi dan Informatika Republik Indonesia, 2020.

⁶¹ Johnny G Plate, "Menkominfo: Kebijakan Transformatif Untuk Ciptakan Ekosistem Digital Mumpuni," Kementerian Komunikasi dan Informatika Republik Indonesia, 2021, https://www.kominfo.go.id/content/detail/31626/menkominfo-kebijakan-transformatif-untuk-ciptakan-ekosistem-digital-mumpuni/0/sorotan_media.

⁶² KNEKS, "KADIN Dukung Upaya Pengembangan Ekonomi Dan Keuangan Syariah," KNEKS, 2022, <https://knks.go.id/berita/491/kadin-dukung-upaya-pengembangan-ekonomi-dan-keuangan-syariah?category=1>.

⁶³ Umkmindustrihalal.id, "Apa Itu Sinergi Akselerasi UMKM Industri Halal?," umkmindustrihalal.id, 2022, <https://umkmindustrihalal.id/sinergi/>.

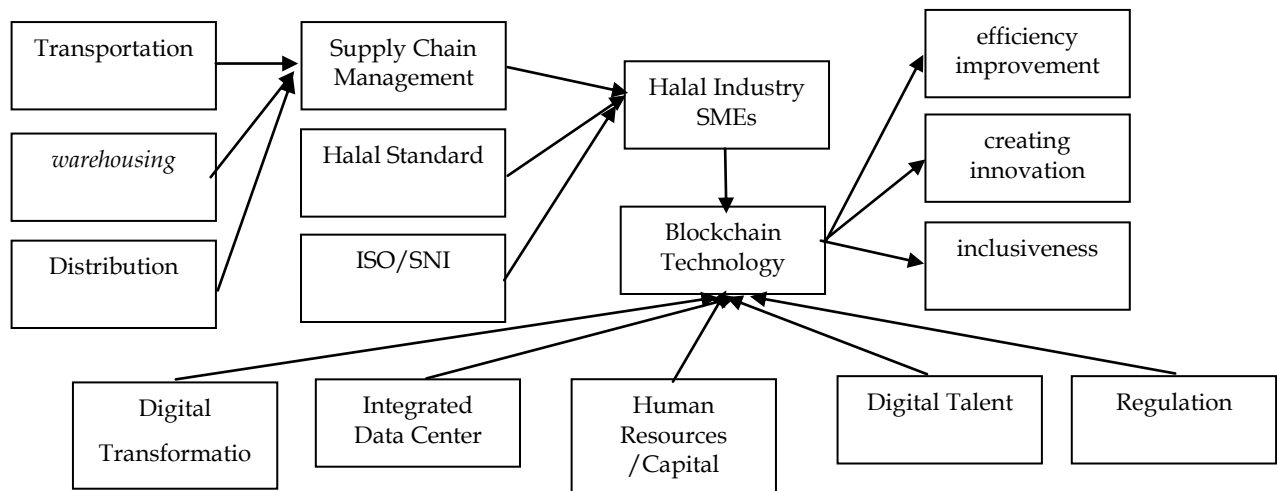


Figure: Ecosystem Blockchain Halal Industry SMEs⁶⁴ (Developed by the Author)

CONCLUSION

The Group of twenty G20 presidencies of Indonesia is significant for economic development in Indonesia. This opportunity can determine the potential for accelerated blockchain with supply chain management adoption. Supply chain management focuses on quality in maintaining the distribution of goods from the tracking system from upstream to downstream of the halal industry. From there, it can be developed into blockchain adoption so that the potential for the halal industry in Indonesia can develop widely. This aligns with the deindustrialization

program through collaboration/synergy for digital transformation that is more inclusive, empowering, compliant with sharia principles (*maqhosid sharia*) and sustainable. From these results, it is essential to know as material for consideration of government policies, industry, and entrepreneurs in considerations related to blockchain adoption through supply chain management principles that are standardized with the principles of the halal industry.

This research is only a normative study related to the discussion on digital transportation of the G20 Indonesia Presidency, blockchain adoption, and the halal industry. The author hopes this research can be developed from a more specific discussion of the literature, either through field studies or other studies that are more in-depth and have a broad impact.

⁶⁴ Plate, "Menkominfo: Kebijakan Transformatif Untuk Ciptakan Ekosistem Digital Mumpuni"; M Farooque, "Circular Supply Chain Management: A Definition and Structured Literature Review," *Journal of Cleaner Production*, 2019, <https://doi.org/10.1016/j.jclepro.2019.04.303>; Fernandez-Vazquez et al., "Blockchain in Sustainable Supply Chain Management: An Application of the Analytical Hierarchical Process (AHP) Methodology."

Author's Contribution

Nur Asnawi: Contribute to formulating research ideas, collecting data, processing data, and interpreting data.

Moch Mahsun: Contributing to writing systematics, research methods

Nevi Danila: Contributing to analyzing interpretation results, the language proofread

Acknowledgements

The researcher would like to thank those who have helped complete this article, especially when collecting data and reviewing the contents of the article.

Declaration of Competing Interest

We declare that we have no conflict of interest

REFERENCES

- Ahmad, Raja Wasim, Walaa Al Khader, Raja Jayaraman, Khaled Salah, Jiju Antony, and Vikas Swarnakar. "Integrating Lean Six Sigma with Blockchain Technology for Quality Management - a Scoping Review of Current Trends and Future Prospects." *The TQM Journal* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/TQM-06-2022-0181>.
- Alam, Nafis, Lokesh Gupta, and Abdolhossein Zamani. *Digitalization and Disruption in the Financial Sector. Fintech and Islamic Finance*, 2019. https://doi.org/10.1007/978-3-030-24666-2_1.
- Alaydrus, Hadijah. "Apa Itu G20? Berikut Sejarah, Agenda, Dan Manfaat Untuk Indonesia." *bisnis.com*, 2022. <https://ekonomi.bisnis.com/read/20220208/9/1497880/apa-itu-g20-berikut-sejarah-agenda-dan-manfaat-untuk-indonesia#:~:text=G20 merupakan kepanjangan dari Group of Twenty. G20,persen perdagangan global%2C dan 80 persen PDB dunia>.
- Arkeman, Yandra, Khaswar Syamsu. "Blockchain Industri Halal." *republika.id*, 2020. <https://republika.id/posts/8334/blockchain-industri-halal>.
- Astuti, Wiwiek Rukmi Dwi. "Kerja Sama G20 Dalam Pemulihan Ekonomi Global Dari COVID-19." *Andalas Journal of International Studies (AJIS)* 9, no. 2 (2020): 131. <https://doi.org/10.25077/ajis.9.2.131-148.2020>.
- Astuti, Wiwiek Rukmi Dwi, and Laode Muhamad Fathun. "Diplomasi Ekonomi Indonesia Di Dalam Rezim Ekonomi G20 Pada Masa Pemerintahan Joko Widodo." *Intermestic: Journal of International Studies* 5, no. 1 (2020): 47. <https://doi.org/10.24198/intermestic.v5n1.4>.
- Bajar, Karthik, Aditya Kamat, Saket Shanker, and Akhilesh Barve. "Blockchain Technology: A Catalyst for Reverse Logistics of the Automobile Industry." *Smart and Sustainable Built Environment* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/SASBE-11-2021-0203>.
- Basyariah, Nuhbatul. "Konsep Pariwisata Halal Perspektif Ekonomi Islam." *Youth & Islamic Economic* 2, no. 01s (2021): 1-6.

- Berawi, Mohammed Ali. "G20 Presidency of Indonesia: Collective and Inclusive Agendas for World Development." *International Journal of Technology* 13, no. 1 (2022): 1-4. <https://doi.org/10.14716/ijtech.v13i1.5479>.
- Binus.ac.id. "Mengenal Blockchain, Teknologi Yang Diprediksi Paling Berpengaruh Di Masa Depan." Binus University, 2021. <https://binus.ac.id/2021/02/mengenal-blockchain-teknologi-yang-diprediksi-paling-berpengaruh-di-masa-depan/>.
- Blockchain, Asosiasi Indonesia. "Perkembangan Teknologi Blockchain Dan Prospek Crypto Asset Di Indonesia." Indonesia Banking School, 2022. <http://ibs.ac.id/en/perkembangan-teknologi-blockchain-dan-prospek-crypto-asset-di-indonesia-2/>.
- Budiansyah, Arif. "Mengintip Eksistensi Blockchain Di Indonesia Dan Peluangnya." CNBC Indonesia, 2020. <https://www.cnbcindonesia.com/tech/20200227130233-37-140844/mengintip-eksistensi-blockchain-di-indonesia-dan-peluangnya>.
- — —. "Saat Kopi Yang Kamu Minum Bisa Dilacak Pakai Blockchain." CNBC Indonesia, 2020. <https://www.cnbcindonesia.com/tech/20200406121254-37-150002/saat-kopi-yang-kamu-minum-bisa-dilacak-pakai-blockchain>.
- Cahyadi, Iman Rahman. "Perkembangan Blockchain Di Indonesia Semakin Masif Di Awal 2022." www.beritasatu.com/, 2022. <https://www.beritasatu.com/lifestyle/897395/perkembangan-blockchain-di-indonesia-semakin-masif-di-awal-2022>.
- Danandjaja, James. "Metode Penelitian Kepustakaan." *Antropologi Indonesia*, 2014.
- Dehghani, Milad, Anna Popova, and Shahin Gheitanchi. "Factors Impacting Digital Transformations of the Food Industry by Adoption of Blockchain Technology." *Journal of Business & Industrial Marketing* 37, no. 9 (January 1, 2022): 1818-34. <https://doi.org/10.1108/JBIM-12-2020-0540>.
- Dini Wahyuni, and Nurul Arfidhila. "Traceability Pada Rantai Pasok Pangan Halal: Review Literatur." *Talenta Conference Series: Energy and Engineering (EE)* 2, no. 4 (2019). <https://doi.org/10.32734/ee.v2i4.649>.
- Ebekozien, Andrew, Clinton Aigbavboa, and Mohamad Shaharudin Samsurijan. "An Appraisal of Blockchain Technology Relevance in the 21st Century Nigerian Construction Industry: Perspective from the Built Environment Professionals." *Journal of Global Operations and Strategic Sourcing* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/JGOSS-01-2022-0005>.
- Farooque, M. "Circular Supply Chain Management: A Definition and Structured Literature Review." *Journal of Cleaner Production*, 2019. <https://doi.org/10.1016/j.jclepro.2019.04.303>.
- Fernandez-Vazquez, Simon, Rafael Rosillo, David de la Fuente, and Javier Puente. "Blockchain in Sustainable Supply Chain Management: An Application of the Analytical Hierarchical Process (AHP) Methodology."

- Business Process Management Journal* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/BPMJ-11-2021-0750>.
- G20.org. "Priority Issues Indonesia's G20 Presidency." Ministry of Communications and Informatics of the Republic of Indonesia, 2022. <https://www.g20.org/g20-presidency-of-indonesia/#priorities>.
- Gaur, Nitin. "Blockchain Challenges in Adoption." *Managerial Finance* 46, no. 6 (January 1, 2020): 849–58. <https://doi.org/10.1108/MF-07-2019-0328>.
- Hendayani, Ratih, and Yudi Fernando. "Adoption of Blockchain Technology to Improve Halal Supply Chain Performance and Competitiveness." *Journal of Islamic Marketing* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/JIMA-02-2022-0050>.
- HOSTING, JAGOAN. "Kenali Peluang Blockchain Di Indonesia, Apakah Menguntungkan?" [jagoanhosting.com](https://www.jagoanhosting.com), 2021. <https://www.jagoanhosting.com/blog/kenali-peluang-blockchain-di-indonesia-apakah-menguntungkan/>.
- Indonesia.go.id. "Mendorong Transformasi Digital Berkelanjutan G20." indonesia.go.id - Portal Informasi Indonesia, 2022. <https://indonesia.go.id/kategori/kabar-terkini-g20/4448/mendorong-transformasi-digital-berkelanjutan-g20?lang=1>.
- Indonesia, Ministry of Communications and Informatics of the Republic of. "ABOUT THE G20." [g20.org](https://www.g20.org), 2022. <https://www.g20.org/about-the-g20/#about>.
- INSIGHT:Buletin Ekonomi Syariah. "Potensi Indonesia Jadi Pusat Logistik Halal Dunia." *Komite Nasional Ekonomi Dan Keuangan Syariah (KNEKS)*. Jakarta, 2020.
- Kiu, Mee San, Kai Wen Lai, Fah Choy Chia, and Phui Fung Wong. "Blockchain Integration into Electronic Document Management (EDM) System in Construction Common Data Environment." *Smart and Sustainable Built Environment* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/SASBE-12-2021-0231>.
- KNEKS. "KADIN Dukung Upaya Pengembangan Ekonomi Dan Keuangan Syariah." KNEKS, 2022. <https://knks.go.id/berita/491/kadin-dukung-upaya-pengembangan-ekonomi-dan-keuangan-syariah?category=1>.
- "Kontribusi Manufaktur Nasional Capai 20 Persen, RI Duduki Posisi Ke-5 Dunia." *Kementerian Industri Republik Indonesia*, 2019. <https://www.kemenperin.go.id/artikel/20579/Kontribusi-Manufaktur-Nasional-Capai-20-Persen,-RI-Duduki-Posisi-Ke-5-Dunia>.
- "Menko Airlangga: Ekonomi Digital Di Indonesia Tertinggi Di Asia Tenggara." *Kementerian Komunikasi dan Informatika Republik Indonesia*, 2022. <https://www.kominfo.go.id/content/detail/41127/menko-airlangga-ekonomi-digital-di-indonesia-tertinggi-di-asia-tenggara/0/berita>.
- Mohmood, Halizan, Rozaimi Abu Samah. "Blockchain Technology Potential in Halal Industry." *Centre For Industry And Community Network*, 2021.

- <https://news.ump.edu.my/industry/blockchain-technology-potential-halal-industry>.
- Noer Qomariah Kusumawardhani, Dwi Murdaningsih. "Mengenal Dunia Blockchain Di Indonesia." *republika.co.id*, 2021. <https://www.republika.co.id/berita/qtj9p368/mengenal-dunia-blockchain-di-indonesia>.
- Nor, Shifa Mohd, Mariani Abdul-majid, and Siti Nabihah Esrati. "The Role of Blockchain Technology in Enhancing Islamic Social Finance: The Case of Zakah Management in Malaysia" 23, no. 5 (2021): 509–27. <https://doi.org/10.1108/FS-06-2020-0058>.
- Plate, Johnny G. "Menkominfo: Kebijakan Transformatif Untuk Ciptakan Ekosistem Digital Mumpuni." Kementerian Komunikasi dan Informatika Republik Indonesia, 2021. https://www.kominfo.go.id/content/detail/31626/menkominfo-kebijakan-transformatif-untuk-ciptakan-ekosistem-digital-mumpuni/0/sorotan_media.
- Putri, Alvela Salsabilah. "G20: Mediator Untuk Kemajuan Ekonomi Indonesia." *Jurnal Hubungan Internasional* 13, no. 1 (2020): 53–64.
- Rachman, Rio Febriannur. "Optimalisasi Media Digital Berbasis Kemaslahatan Umat Dalam Program Pahlawan Ekonomi Surabaya." *Iqtishoduna* 8, no. 2 (2019): 273–92.
- — —. "Pengembangan Industri Kreatif Berbasis Media Digital Di Surabaya Dalam Perspektif Islam." *Komunitas* 10, no. 2 (2019): 157–76. <https://doi.org/10.20414/komunitas.v10i2.1227>.
- Rahardja, Untung, Qurotul Aini, Muhamad Yusup, and Aulia Edliyanti. "Penerapan Teknologi Blockchain Sebagai Media Pengamanan Proses Transaksi E-Commerce." *CESS (Journal of Computer Engineering, System and Science)* 5, no. 1 (2020): 28. <https://doi.org/10.24114/cess.v5i1.14893>.
- Santoso, Wahyu Budi. "Perkembangan Blockchain Di Indonesia Semakin Masif." *sindonews.com*, 2022. <https://tekno.sindonews.com/read/700155/207/perkembangan-blockchain-di-indonesia-semakin-masif-1646129031>.
- Setyowati, Hermin Esti. "Transformasi Digital Yang Inklusif Turut Percepat Pembangunan Berkelanjutan." Kementerian Koordinator Bidang Perekonomian Republik Indonesia, 2020. <https://ekon.go.id/publikasi/detail/330/transformasi-digital-yang-inklusif-turut-percepat-pembangunan-berkelanjutan>.
- Sinaga, Widya Aprilina. "Presidensi G-20, Pulihkan Perekonomian Indonesia." Kementerian Keuangan Republik Indonesia, 2022. <https://www.djkn.kemenkeu.go.id/artikel/baca/14784/Presidensi-G-20-Pulihkan-Perekonomian-Indonesia.html>.
- Spanò, Rosanna, Maurizio Massaro, Luca Ferri, John Dumay, and Jana Schmitz. "Blockchain in Accounting, Accountability and Assurance: An Overview."

- Accounting, Auditing & Accountability Journal* 35, no. 7 (January 1, 2022): 1493–1506. <https://doi.org/10.1108/AAAJ-06-2022-5850>.
- Sukoso, Adam Wiryawan, Joni Kusnadi, Sucipto. *Ekosistem Industri Halal. Departemen Ekonomi Dan Keuangan Syariah - Bank Indonesia*. Asep A. Pr. Jakarta: Departemen Ekonomi dan Keuangan Syariah - Bank Indonesia, 2020. <https://doi.org/10.30595/pssh.v5i.420>.
- Syafri, Riza Aditya, and Azizah Ulfa. "Teknologi Blockchain Dan Potensinya." *Buletin APBN VI*, no. 11 (2021): 7–10. www.puskajianggaran.dpr.go.id.
- Tiwari, Chandan Kumar, and Abhinav Pal. "Using Blockchain for Global Governance: Past, Present and Future." *South Asian Journal of Business Studies* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/SAJBS-07-2022-0252>.
- Toarik, Mashud. "Targetkan Transformasi Digital Dalam 3Tahun, Kominfo Gagas 5 Langkah." Kementerian Komunikasi dan Informatika Republik Indonesia, 2020.
- Treviliana Eka Putri, Nabilah Nur Abiyanti. "Transformasi Digital Dalam Agenda G20: Menuju Pembangunan Digital Yang Bermakna Dan Berkelanjutan." In *G20 Di Tengah Perubahan Besar (Momentum Kepemimpinan Global Indonesia)*, edited by Wawan Mas'udi Poppy S. Winarti, 55–73. Jogjakarta: Gadjah Mada University Press, 2022.
- Umkmindustrihalal.id. "Apa Itu Sinergi Akselerasi UMKM Industri Halal?" umkmindustrihalal.id, 2022. <https://umkmindustrihalal.id/sinergi/>.
- Xu, Dong, Jing Dai, Antony Paulraj, and Alain Yee-Loong Chong. "Leveraging Digital and Relational Governance Mechanisms in Developing Trusting Supply Chain Relationships: The Interplay between Blockchain and Norm of Solidarity." *International Journal of Operations & Production Management* ahead-of-p, no. ahead-of-print (January 1, 2022). <https://doi.org/10.1108/IJOPM-02-2022-0122>.
- Yarkoni, Tal. "The Generalizability Crisis." *Behavioral and Brain Sciences* 45 (2022). <https://doi.org/10.1017/S0140525X20001685>.