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BLOCKCHAIN FOR HUMAN RIGHTS AND E-GOVERNANCE

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AUTHOR'S DECLARATION

I, the undersigned **Saumya Raval** hereby declare that I am the sole author of this thesis.

To the best of my knowledge, this thesis contains no material previously published by any other person except where due acknowledgment has been made. This thesis contains no material which has been accepted as part of the requirements of any other academic degree or non–degree programs, in English or any other language.

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EXECUTIVE SUMMARY

Transformative Technologies like the Blockchain and Artificial Technologies are getting adopted across all sectors and industries – financial services, healthcare, e-governance, pharmaceutical, global supply chains, education, humanitarian and human rights aid, etc. The organizations utilizing these technologies for social impact have observed notable benefits including great transparency, effectiveness, efficiency, security, privacy, traceability, accountability, and cost reductions.

Even though it is early to celebrate the success of these initiatives as they are still evolving and yet to achieve their stated objectives, it is worth noting that Blockchains are being deployed to support a growing number of human rights claims – to conduct free and fair elections; mapping land ownership for safeguarding tribal rights; documenting instances of environment pollution for building evidence for public interest litigations; bringing transparency, efficiency and effectiveness in policy implantation; curbing corruption; aiding free speech and countering fake news; and easing economic hardships during hyperinflation.

The objective of this paper is to conduct an in-depth study of the adoption of blockchain technology and understand the scope and challenges in the context of two sectors i.e., Supply Chain and Digital Identity. The author will also put forward recommendations under the idea of 'governance through blockchain and governance of blockchain'.

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INTRODUCTION

The role of e-governance in delivering public services to the citizens has become crucial. The use of Information and Communication Technologies (ICT) in providing good governance is quintessential.[1] E-governance uses ICT to effectively deliver public services to citizens and foster their participation in democratic processes.[2] E-governance systems are addressing several fundamental challenges that governments have faced since time immemorial like implementation, inclusiveness, effectiveness, and sustainability of public policies.

Among the myriad technologies being utilized for e-governance initiatives, there are some which stand apart because of their reliability, compatibility, data safety, innovativeness, and inclusiveness. Blockchain has emerged as a technology to address such challenges structurally. Its immutable nature to record transactions maintained by a set of decentralized and distributed nodes has emerged as a trust-building protocol for governments and citizens. It is a decentralized network whose records are stored in 'blocks' that are continuously maintained and verified by a peer-to-peer computer network. It can only be modified through the addition of new blocks; pre-existing blocks cannot be edited, adjusted, or changed.

The Blockchain technology implementation is aimed at decentralizing the whole organization or a sector, by replacing this trust with a cryptographic proof, creating a transparent, distributed, peer-to-peer network for performing transactions. A blockchain network consists of a distributed database of all transactions that are then verified by nodes within the network. After the relaying

[1] Stoiciu, Andreea. "The Role of e-Governance in Bridging the Digital Divide", United Nations Chronicle, *available at: <https://www.un.org/en/chronicle/article/role-e-governance-bridging-digital-divide> (accessed 10 October 2022).*

[2] Ibid.

and verification of these transactions, they are combined with other transactions to formulate a block and added to the Blockchain network. The trust-less feature of the Blockchain allows for all computing power on the network to have a copy of these transactions in the form of a ledger, and the ability to invalidate a transaction, if it seems to be an illegitimate one.

The Distributed Ledger and Blockchain Technology are at their nascent stage but have the potential of unlocking an application that can be applied in diverse sectors, to make them efficient and transparent. The concept aims at eliminating the root cause of all major problems faced by an individual and by a corporation, that is, the violation of 'trust'. The meaning of 'trust' here signifies a very wide domain of activities, from bookkeeping and managing bank transactions, to the cab driver, school teacher, and local, government representative, with whom our faith resides at some the other points.

The most common example of a successful Blockchain application is the digital currency "bitcoin". It is based on the cryptographic hash function and serves as an alternative to fiat currency, by creating a decentralized ledger with peer-to-peer management of transactions. The proof-of-work concept requires solving cryptographic math problems by using computing power, to receive a bitcoin as a consequence of this work (application of computing power). The 'miners' who use this computing power to extract bitcoins, also maintain the network by validating transactions within a block and getting a bitcoin as a result of this work.

However, the applications of Blockchain extend far beyond the domain of cryptocurrency.[3] The introduction of a programmable public Blockchain like Ethereum empowered the execution of smart contracts. Its potential in representing complex business operations as smart contracts fueled

[3] Zambrano, Raúl, "Blockchain: Unpacking the disruptive potential of block- chain technology for human development." International Development Research Centre (August 2017).

the idea of blockchain's application for diverse areas.[4] The decentralized, distributed nature and cryptographically secured transaction execution with the need of an intermediary make it a prime choice for deploying secure applications, especially for e-governance and safeguarding human rights.

The idea of this thesis is to give an insight into addressing the Human Rights challenges with the use of Blockchain Technology. The thesis refers to the United Nations Guiding Principles on Business and Human Rights as a guiding charter for recommending reforms in business practices by demonstrating how the Blockchain initiatives impact the Human Rights standard of the companies and reduce the risks of its abuse.[5] This is not only relevant for companies but for individuals, civil society organizations, International Originations, and government agency that needs to reform their policies and practices for ensuring compliance with the Human Rights standards.

Blockchain is being used by many countries like Estonia – for providing public services like e-voting, digital ID, health record management, land registration, education, banking, etc.[6] It is also being used by several organizations like the United Nations (UN) and Non-Governmental Organizations (NGOs) for safeguarding Human Rights – by the World Food Programme (WFP) in developing a digital identity of refugees; Stop the Traffik created the first blockchain-trackable T-shirt supply chain which empowers workers to submit verification that their labor rights were ensured at each stage of the production process i.e., from harvest to production to selling.

[4] Nick Szabo, "Smart Contracts," 1994, https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html.

[5] The United Nations Guiding Principles on Business and Human Rights.

[6] 'E-Estonia: Building a digital society', https://e-estonia.com/solutions/.

Even though it is early to celebrate the success of these initiatives as they are still evolving and yet to achieve their stated objectives, it is worth noting that Blockchains are being deployed to support a growing number of Human Rights claims – to conduct free and fair elections; mapping land ownership for safeguarding tribal rights; documenting instances of environment pollution for building evidence for public interest litigations; bringing transparency, efficiency and effectiveness in policy implantation; curbing corruption; aiding free speech and countering fake news; and easing economic hardships during hyperinflation.

This thesis addresses the impact on the Human Rights of Blockchain Technology by first determining the rights in focus. The rights have been identified in two main sectors and their case studies i.e., Supply Chain and Digital Identity. It commences with an overview of the operational mechanism of blockchain and then it elaborates on how it can impact diverse sectors with its myriad use cases. With the help of examining these use cases, the thesis will showcase blockchain's effect on Human Rights challenges. This analysis concludes with recommendations for organizations to guide them in implementing blockchain technology that could strengthen human rights around the globe.

HYPOTHESIS

The hypothesis of this research is as follows:

Even though it is early to celebrate the success of the Blockchain technology-backed initiatives as they are still evolving and yet to achieve their stated objectives, it is worth noting that Blockchains are being deployed to support a growing number of human rights claims – to conduct free and fair elections; mapping land ownership for safeguarding tribal rights; documenting instances of environment pollution for building evidence for public interest litigations; bringing transparency, efficiency and effectiveness in policy implantation; curbing corruption; aiding free speech and countering fake news; and easing economic hardships during hyperinflation.

The overall objective of this thesis is to trace, analyze and evaluate the best practices in such initiatives of the supply chain and digital identity wherein blockchain technology has been deployed and can be implemented by the United Nations, Governments, NGOs, and Private organizations for ensuring and safeguarding Human Rights.

RESEARCH QUESTION

The following research questions will be dealt with in this study, aiming to envisage the problem to its roots:

"Can a transformative technology like the Blockchain prove to be effective and efficient in dealing with the challenges and risks faced to human rights?"

RESEARCH METHODOLOGY

The research methodology adopted is doctrinal, to come up with a pragmatic legal model.

The resources for this research are primary and secondary. Books, articles, studies, empirical research, and other publications are referred to for grasping the research problem to its roots. The research will also use various case study analysis articles and publications done by notable Blockchain and Policy initiatives for drawing a complete picture.

CHAPTER – 1 | WHAT IS BLOCKCHAIN?

A Blockchain can be simply explained as a distributed database of records or a public ledger of all transactions or digital events that have been executed and shared among participating parties.[7] Each transaction in the public ledger is verified by the consensus of a majority of the participants in the system. Once the information is entered, it can never be erased. The Blockchain contains a certain and verifiable record of every single transaction ever made. To use a basic analogy, it is easy to steal a cookie from a cookie jar, kept in a secluded place than to steal the cookie from a cookie jar kept in a marketplace, which is observed by thousands of people.[8]

For understanding Blockchain technology, we will take the case of Bitcoin (although the application should not be understood as limited to such 'coins', as these are just the tip of the Blockchain iceberg). Bitcoin is renowned as the most famous outcome of Blockchain technology and has faced both appreciation and criticism since its inception. Bitcoin took birth from of paper published by Satoshi Nakamoto titled - 'Bitcoin: A peer-to-peer electronic cash system'.[9] It utilizes a cryptographic hash system and has been serving as an alternative to fiat currency, by creating a decentralized ledger with peer-to-peer management of transactions. The proof-of-work concept requires solving cryptographic math problems by using computing power, to receive a bitcoin because of this work (application of computing power). The 'miners' who use this computing power to extract bitcoins, also maintain the network by validating transactions within a block and getting a bitcoin because of this work.

[7] Lucas Marx "Storing Data on the Blockchain: The Developers Guide," Macoded, July 5, 2018, https://malcoded.com/posts/storing-data-blockchain/

[8] 'Blockchain Technology Beyond Bitcoin' (Berkeley University Sutardja Center for Entrepreneurship & Technology 2015).

[9] Nakamoto S, 'Bitcoin: A Peer-To-Peer Electronic Cash System' [2008].

The cryptocurrency has faced various problems in the form of government condemnation, and its use in various illegal operations, due to its highly anonymous nature.[10] "On the other hand, Marc Andreessen, the doyen of Silicon Valley's capitalists, listed the Blockchain distributed consensus model as the most important invention since the Internet itself. Johann Palychata from BNP Paribas wrote in the Quintessence magazine that bitcoin's blockchain, the software that allows the digital currency to function should be considered an invention like the steam or combustion engine that has the potential to transform the world of finance and beyond."[11]

The essential feature of the Blockchain the researcher wishes to emphasize is the 'distributed consensus' and a system eliminating the need for 'trust'. The banking system, securities market, education system, public bodies, governments, and international bodies, everything around us works on the principle of trust. This trust has often been violated over the years, as highlighted by various scams and disputes all over the world.[12] Politicians are caught in corruption scandals, banks need bailouts after giving bad loans, and the securities market often faces fraud or malfeasance of sorts. This all emanates from the violation of trust that we as citizens of a social contract, have placed on these institutions.

Blockchain technology can eliminate this need for trust and hand over everything to the stakeholders, or the citizens.[13] Although suffering from regulatory issues and technical challenges, the technology although in its nascent stage, can change the way of life for everyone on this planet.

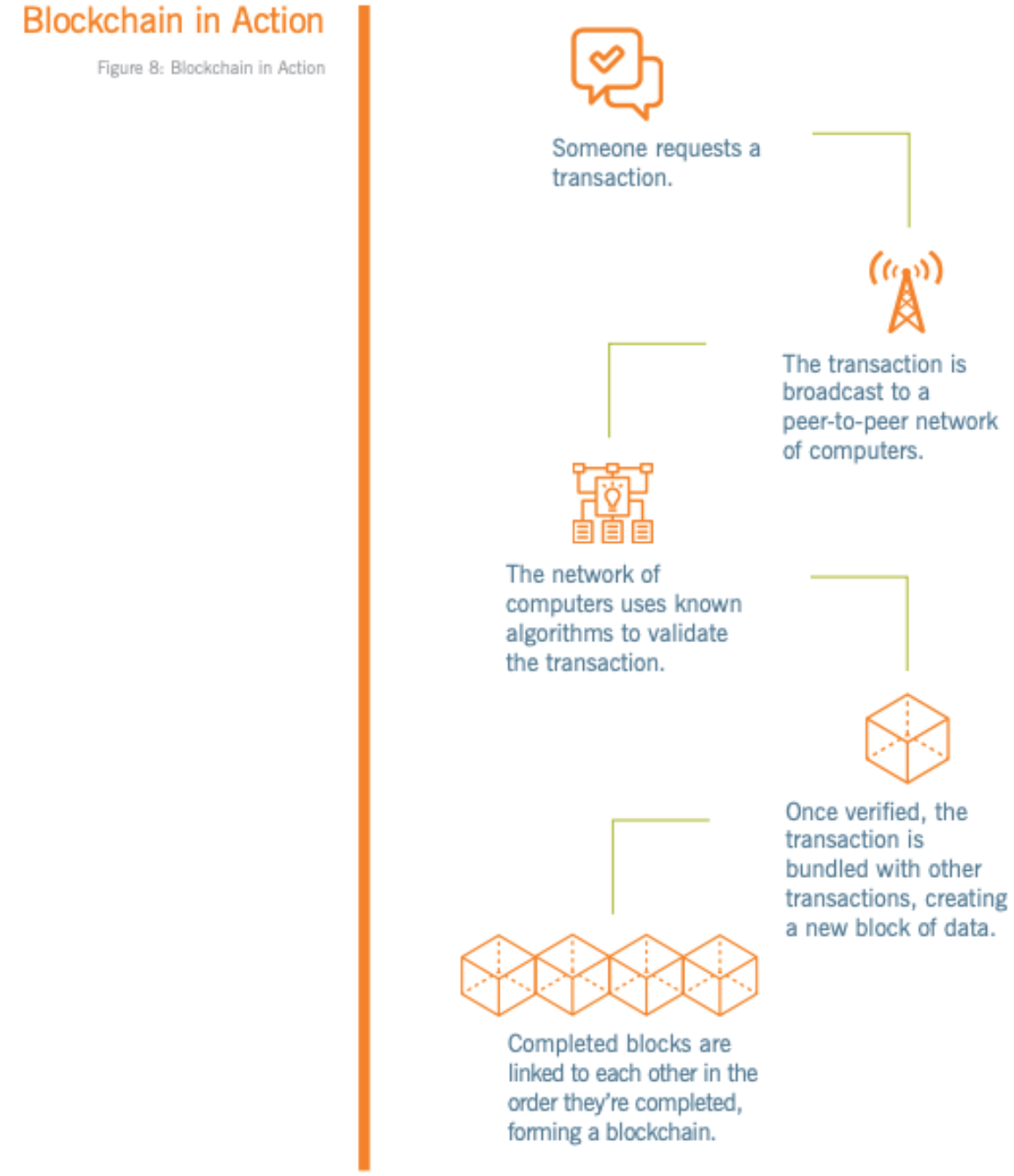
[10] "Bitcoin Energy Consumption Index," Digiconomist, n.d., https://digiconomist.net/bitcoin-energy-consumption.

[11] Delloite LLP, 'Blockchain Enigma Paradox Oppurtunity' (Deloitte LLP 2016).

[12] Hughes, Kobina, 'Blockchain, The Greater Good, and Human and Civil Rights'. Metaphilosophy. 48. 654-665. 10.1111/meta.12271 (2017).

[13] Ibid.

CREATION OF A BLOCKCHAIN NETWORK[14]



[14] 'Blockchain for Social Impact', Center for Social Innovation, Sandford Graduate School of Business (2022).

CHAPTER - 1.1 | FEATURES OF A BLOCKCHAIN[15]

- Distribution of data across all computers of the users, in real-time. This provides direct access to the copy of Blockchain to all the stakeholders, thus negating the need for a central institution such as a Bank.
- Digital signatures backed by cryptography are providing security and validate transactions. E.g., the SHA-256 and RIPEMD-160 encryption used in bitcoins are one of the strongest encryptions. It reduces the risk of fraud and theft, allowing the identification of members and organizations.
- Decentralization and participation by the users is another outstanding feature of the blockchain, and it gives the users the power to keep track of their transactions, and the network as a whole. There is no need for a central verifying authority.
- The Blockchain data, once stored cannot be erased or altered, except in theory with more than 50% consensus of the users on the network. This makes it highly improbable to cause any tampering with information that has been stored on the blocks.
- Blockchains are time-stamped, providing an accurate source for verification.
- The programmable nature of blockchains makes them easy to use in several applications to create self-executing operations, based on certain programmed pre-conditions. E.g.: If by 1st January 2017, the payment of Rs. 1 crore is not received by the Bank of Baroda from Mr. XYZ, the property kept as a guarantee shall be transferred to the Bank and all revenue records and mutation entries can be changed according to the program. As utopian as it may sound, this kind of application is possible with the spread of Blockchain.

[15] Supra note 9.

CHAPTER – 1.2 | ADVANTAGES OF BLOCKCHAIN

1. Immutability

The most prominent benefit offered by the Blockchain network systems is their unique ability of encryption and making the complete network tampering proof.[16] It is possible that when data entries are made in a conventional database, then they can be easily manipulated. But in the blockchain technology, the full details of every action recorded on it is immutable that prevents tampering and also makes sure that any amendments that are made to the network are evident to all the stakeholders of the network.

2. Transparency

Blockchain technology offers innumerable benefits when compared to conventional database systems like transparency. In the case of all centrally controlled conventional databases, only one party has complete control and access to it. But the Blockchain network allows every node on the system to have live access to all transactions happening on the network and access to a full background check of all previous transactions. This degree of transparency is well required in scenarios wherein parties do not trust anyone and need a means of supervising the transactions.[17]

3. Resilience

Blockchain technology's distributed trait empowers the network in being more resilient to any kind of shock – may it be conflict, war, natural disasters, or any vindictive activity. When compared with centralized systems, the peer-to-peer system provided by blockchain could not

[16] Supra note 5.
[17] Supra note 14.

be made offline simply by targeting a single node. The public Blockchain networks are significantly more resilient in comparison with their private counterparts. It is because the larger the size of the network, the more resilient it is. This level of resilience is dependent upon the diversity that exists in the system. During natural disasters or conflicts, the Blockchain network should have been equipped with sufficient geographical diversity to continue functioning despite hindrances. During an attack from hackers, the blockchain network should have decent infrastructural tech diversity for hosting nodes that will be able to resist spiteful activity if they are targeting any specific vulnerability of the computer.

4. Efficiency

Blockchain technology can make and maintain identities for individuals at a lower cost, in a more secure format, with the digital signature technology – this gives people a public key (similar to an account number) and a private key (similar to a password). A key potential impact of this is that underserved populations, like the ones without a bank account, receive access to services never before possible.

CHAPTER – 2 | BLOCKCHAIN FOR HUMAN RIGHTS

Blockchain technology has an immense potential of unlocking an application that can be applied virtually in every possible field, to make it efficient and transparent.[18] The concept aims at eliminating the root cause of all major problems faced by an individual and by a corporation, that is, the violation of 'trust'. The meaning of 'trust' here signifies a very wide domain of activities, from bookkeeping and managing bank transactions, to the cab driver, schoolteacher, and, local government representative, with whom our faith resides.

Blockchain is a technology aimed at decentralizing an organization or a sector, by replacing this trust with a cryptographic proof, creating a transparent, distributed, peer-to-peer network for performing transactions. A Blockchain network is a distributed database containing transactions that have been verified by nodes within the network. After the relaying and verification of these transactions, they tag with other transactions to make a block by block resulting in the creation of a Blockchain. The trust-less feature of the Blockchain allows for all computing power on the network to have a copy of these transactions in the form of a ledger, and the ability to invalidate a transaction, if it seems to be an illegitimate one.

Because of the advantages and myriad applications of Blockchain technology, there have been proposed it address several Human Rights problems like supply chain traceability, voting transparency, privacy-backed identity management, protection of land rights, etc.[19] Because the Human Rights challenges are so complicated, Blockchain only cannot be sufficient to address the

[18] CleanApp, Blockchain Governance 105: International Law, Medium.com, October 10, 2018, retrieved online: https://medium.com/cryptolawreview/blockchain-governance-105-international-law-3c7ebd025a43.

[19] William Crumpler, 'Blockchain Technology: Human Rights Risks & Opportunities', Center for Strategic and International Studies, December 14, 2021.

dynamic challenges that lead to Human Rights abuses. While the technology provides new opportunities for organizations and individuals to address Human Rights issues, it is required to ensure that these potential solutions must ensure that do not adversely affect the ongoing issues and add to the challenges humanity is facing.

CHAPTER – 2.1 | TRACING SUPPLY CHAIN

Supply Chains are rapidly expanding globally because of the free trade agreements that diminish the hindrances to trade.[20] The tech advancements in production and shipment have been a crucial factor in making the supply chain international. Nowadays, any product is usually produced with its contents acquired or manufactured from multiple states, assembled in several areas, and exported to consumers around the globe. This requires the global supply chains to reply to numerous layers of suppliers from multiple countries.

For any business, it is essential to profit from its operations. To survive and sustain, the majority of businesses drive to continuously reduce input costs that trigger exploitation of their workers (especially the ones coming at the last level of their value chain). Article 4 of the Universal Declaration of Human Rights (UDHR)[21] and Article 8 of the International Covenant on Civil and Political Rights (ICCPR) have mandated a ban on forced and bonded labor.[22] More than 170 nations have been a signatory of the International Labor Organization's convention on forced labor.[23]

Still, approximately 24 million individuals all over the planet are exposed to forced labor work and many millions more work under other oppressive work conditions.[24] The governments are

[20] Runqi Zhang, Jinlong Zhao & Jingyuan Zhao (2021) Effects of free trade agreements on global value chain trade - a research perspective of GVC backward linkage, Applied Economics, 53:44, 5122-5134, DOI: 10.1080/00036846.2021.1917763.

[21] Article 4, the Universal Declaration of Human Rights (UDHR)

[22] Article 8, the International Covenant on Civil and Political Rights (ICCPR)

[23] "Ratifications of fundamental Conventions by country," International Labour Organization (ILO), n.d., https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:10011:0::NO::P10011_DISPLAY_BY,P10011_CONVENTION_TYPE_CODE:1,F.

[24] ILO, Global estimates of modern slavery: Forced labour and forced marriage (Geneva: 2017), https://www.alliance87.org/global_estimates_of_modern_slavery-forced_labour_and_forced_marriage.pdf.

increasing the mandates to have a stricter Human Rights compliance mechanism not only by the producers or manufacturers but also by end-user companies. At this stage, even a lot of organizations are seeking to improve their Human Rights maintenance standards in their respective international supply chains. Hence, Blockchain technology is proposed to be a potential means to aid and advise their existing supply chain traceability and transparency initiatives.[25]

What does Traceability in the Supply Chain mean for Human Rights?

A supply chain is considered to be traceable when there is a possibility to track and identify every stakeholder that has contributed to the production of the particular product. The mechanism of traceability empowers the companies and government officials to track, recognize and understand the risks involved across the supply chain. Traceability is crucial for Human Rights standards because an absence of accurate traceable data means the source of raw materials or other inputs could have been fabricated or got lost off-the-book/unorganized supplies – making it extremely complex for the last user companies or government to hold any supplier for the Human Rights standards.

What does Transparency in the Supply Chain mean for Human Rights?

A supply chain is considered to be transparent wherein there is precise and reliable detail available for every stakeholder of the supply chain. It also enables any third-party observer or governmental official to map the products exactly that have been produced or manufactured at what locations and the status of the essential conditions required to be maintained for the production including the labor standards.

[25] Supra note 18.

CHAPTER – 2.2 | THE NEED FOR BLOCKCHAIN

For any corporation, for undertaking a supply chain due diligence effectively and remedy the issues of Human Rights violations in it like forced labor – there is needed comprehensive traceability and complete transparency.[26] The introduction of Blockchain in the supply chain is an effort to address both i.e., traceability and transparency. By utilizing Blockchain, the aim is to establish a shared and trusted log for the source of a product and the status of the conditions it has been produced and shipped.[27]

As states progressively move to command basic freedoms a reasonable level of effort by end-client organizations, and a few driving organizations try to further develop regard for human rights in their supply chains, Blockchain is being introduced to help support supply chain traceability and transparency actions. It has been progressed as a system for organizations to follow actual intermediate/final goods as they travel through a store network and lay out a typical, confided record for the place of origin of those products and the conditions of their creation.[28]

The coordination of transparency and decentralized distributed nature enabled Blockchain to foster an innovation remarkably instrumental for supply chain traceability projects. Blockchain can work with the recording of supply chain information, e.g., the date and area of harvesting

[26] "Corporate due diligence and corporate accountability: European Parliament resolution of 10 March 2021 with recommendations to the Commission on corporate due diligence and corporate accountability," European Parliament, 2020/2129(INL), March 10, 2021, https://www.europarl.europa.eu/doceo/document/ TA-9-2021-0073_EN.pdf; Know the Chain, 2021 Apparel and Footwear Benchmark Report (London: 2021), https://knowthechain.org/wp-content/uploads/2021-KTC-AF-Benchmark-Report.pdf.

[27] Hannah Boles, Tracking Progress: Assessing Business Responses to Forced Labour and Human Trafficking in the Thai Seafood Industry (New York: Praxis Labs, 2019), http://www.praxis-labs.com/ uploads/2/9/7/0/29709145/09_hu_report_final.pdf.

[28] Jerwin Tholen et al., Is there a role for blockchain in responsible supply chains? (Paris: OECD, 2019), http:// mneguidelines.oecd.org/Is-there-a-role-for-blockchain-in-responsible-supply-chains.pdf.

or manufacturing – that is crucial for recognizing high-risk products or other commodities. and in following an item through its life cycle to help organizations extensively track their stock chains.

The key expected benefit for supply chain traceability actions will be the live traceability provided by the Blockchain network. This can substantially bring down the managerial obligation of due diligence norms and promote a consistent supervising of suppliers.[29] The distributed technology framework has the potential to provide remarkable benefits that could bring down the expense of executing traceability programs, work on the organization's capacity to expand, and develop trust among other involved originations.[30]

How to introduce Blockchain in Supply Chain Traceability?

Track a supply chain of any corporation, it can be done by making a digital token on the Blockchain network for every component of the product. They will be utilized to track the goods openly as they flow via all stakeholders one by one.[31]

The records collected on the Blockchain can have myriad sets of data like date of production, quality of the commodity, and the producer's identity along with the details describing the workers' conditions. As the products will rise in the supply chain, in every step these Blockchain tags are scanned by the workers to update their status description in the Blockchain network. As all the components are added to create a new product – those inputs are tagged with the new outputs to give a completely transparent record of the commodity's supply chain

[29] "Building Sustainable Supply Chains," New America, March 31, 2021, https://www.newamerica.org/digital-impact-governance-initiative/events/building-sustainable-supply-chains/.

[30] Ibid.

[31] Supra note 18.

journey. The consolidated data can be then accessed by the end consumers or downstream buyers which will help them in understanding the given commodity's complete origin story.

Right in focus - Prohibition of slavery and forced labor

In the matters of the rights of the workers, the crucial query raised around Blockchain traceability initiatives is how would this network provide accurate details about the conditions of the labor of a particular producer.[32] The following are the three approaches to address this issue –

1. Utilizing the Blockchain for recording the outcomes of the third parties like auditors.
2. Utilizing the Blockchain to maintain the worker's information regarding the working conditions (recorded by the workers themselves).
3. Utilizing the Blockchain to automatically record details of the corporation's business e.g., the movements of the transport vehicles such as ships, the remuneration of workers, and the data of interactions with the regulatory and enforcement authorities, etc.

By linking the various data points collected on the Blockchain connecting to the producers of the commodity – a conclusion can be drawn on how the workers involved in the supply chain are being treated. This can help the end-user, downstream buyer, or government official to conveniently access a wider scope of data to assist in the due diligence processes.[33]

Blockchain's function in the supply chain network is that it ensures the inputs of the workers are recorded openly and immutably. It gives an assurance to workers that their responses are

[32] Christine Chow et al., "Supply Chain Human Rights Risk Management: Blockchain and Emerging Technology," DLA Piper, Hermes, RCS Global, and Everledger, November 2018, https://respect.international/wp-content/uploads/2019/08/Supply-Chain-Human-Rights-Risk-Management-2018.pdf.

[33] Ibid.

logged exactly without disclosing their identity.[34] For E.g.vi Strauss is using a pilot project on blockchain-based system that helps the workers from their factories of Mexico and Poland record their well-being surveys.[35] Hence, to let the worker record and report the data directly on the Blockchain is a viable option. Another e.g., is of the Libertas app (an initiative of slavefreetrade) – it promotes workers to self-report about the conditions at factories and in turn this leads to calculation of risk score for producers.[36] The unique aspect about this system is that once the data is recorded them it is immutable on the Blockchain and the information derived from the network can be comprehensively accessed by the stakeholders and could provide to be very vital for the final due diligence process.

By observing and analyzing the operation data of the corporation, an insight into the status of the labor conditions can be derived. By creating a database of the company's business operations, all other stakeholders like auditors, NGOs and the end consumers like buyers can create a system for default flagging of potentially risky behaviors of the business. E.g., seafood industry can enable the third parties to monitor their vessel and track their ship movements. This helps in the revelation of the high-risk practices of the ship like being out on the sea for over one year (indicating a potential labor violation factor).[37]

Blockchain can aid the workers in bringing to the notice critical high-risk practices like irregular remuneration recording, increasing turnover rates of workers and improper records of

[34] Hackett, Robert. "Why Blockchains and Identity Go Together." Fortune. com, January 20, 2018. http://fortune.com/2018/01/20/block- chain-identity-civic-silicon-slopes/

[35] 'Levi Strauss to use blockchain to track factory worker health', Ledger Insights, January 24, 2019, https://www.ledgerinsights.com/levi-strauss-blockchain-worker-health/.

[36] Mike Scott, 'How Slavefreetrade is using blockchain to shine a light on the good guys', Reuters Events, August 6, 2019, https://www.reutersevents.com/sustainability/how-slavefreetrade-using-blockchain-shine-light-good-guys.

[37] Supra note 18.

legal documentation.[38] This final result of the in-depth supervising system can alert the suppliers for the high risk from their illegal or abusive practices, help in due diligence and mitigating actions by downstream buyers and government regulators.[39]

Smart contracts via Blockchain

Smart contracts are based on blockchain that use the pre-set code to automatically undertake the provisions of a contract. They are programmed to execute transactions via a Blockchain network upon the completion of certain set of conditions e.g., of funds via a bank account, property ownership or updating the information of consignment as it goes ahead in a supply chain.[40] For all such cases, the algorithms and its outcomes are saved on the Blockchain in an open and immutable format.

The main idea of smart contracts is that the decentralized ledger can be utilized for registering, and transferring any kind of contracts and property. The founder of blockchain i.e., Satoshi Nakamoto[41] initiated it by detailing escrow transactions, fixed contracts, third-party arbitration, and transactions requiring signatures of multiple parties all types of financial transactions can be reinvented on the blockchain like stock market, crowdfunding, bonds, private equity, mutual funds and pension funds etc.[42]

[38] "How tech is transforming the fight against modern slavery," slavefreetrade, June 18, 2021, https:// slavefreetrade.org/how-tech-is-transforming-the-fight-against-modern-slavery/; and "Brian Iselin: Can Blockchain Technology Make Trade Slave-Free?," The Inc. Tank, Ed Snider Center for Enterprise & Markets, January 2019, https://edsnidercenter.org/inctank-podcast-brian-iselin/.

[39] Ibid.

[40] Nick Szabo, "Smart Contracts," 1994, https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/ CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html.

[41] Joshua Davis, The Crypto-Currency: Bitcoin and its mysterious inventor, The New Yorker, October 10, 2011, retrieved online: https://www.newyorker.com/magazine/2011/10/10/the-crypto-currency.

[42] Swan M, Blockchain: Blueprint For A New Economy (2nd edn, O'Reilly 2015)

Smart contracts enable the parties that have trust deficit to enter into contracts simply based on their mutual faith in the underlying code of the smart contract. It has allowed organizations to negate the need for any third parties, to expedite the efficiency of transactions, removing any scope for manipulation, and minimizing reconciliation costs. In the advanced level of Blockchain's implementation, it can the potential to enable a larger level of automation because a lot of operations today can be easily preprogrammed and entrusted to function in line with the expectations of all the stakeholders. However, the introduction of smart contracts might have risks because of the possibility of any false or incomplete detail logged to the Blockchain. It could potentially trigger the execution of contracts in ways not desired by the parties.

The applications range of smart contracts can commence from monetary transactions, public records and identification systems, to private records such as loans and contracts, attestation by the public/users of the blockchain, physical asset keys preventing unauthorized entries, and validation to intangible assets such as patents, domain names, copyright etc.

"A contract in the traditional sense is an agreement between two or more parties to do or not do something in exchange for something else. Each party must trust the other party to fulfill its side of the obligation. Smart contracts feature the same kind of agreement to act or not act, but they remove the need for one type of trust between parties. This is because a smart contract is both defined by the code and executed by the code, automatically without discretion. Contract compliance or breach is at the discretion of human agents in a way that it is not with blockchain-based or any kind of code-based contracts."[43]

[43] Ibid

In, Blockchain: A Blueprint for the new economy, Author Melanie Swan provides a comprehensive idea of the 3 main essentials of smart contracts, i.e. autonomy, self-sufficiency, and decentralization.

"Threes of smart contracts that make them distinct are autonomy, self-sufficiency, and decentralization. Autonomy means that after it is launched and running, a contract and its initiating agent need not be in further contact. Second, smart contracts might be self-sufficient in their ability to marshal resources—that is, raising funds by providing services or issuing equity, and spending them on needed resources, such as processing power or storage. Third, smart contracts are decentralized in that they do not subsist on a single centralized server; they are distributed and self-executing across network nodes."[44]

Take the case of a vending machine which has been encoded to follow a set of instructions. When money is inserted into the machine and the product is selected, the machine follows the code and executes the agreement between the buyer and seller, and releases an item. There is no need for placing any trust here, as "code is law" in this case. The machine cannot feel like not complying, or only partly complying. A smart contract works similarly,similarlyrk on trust or any other human emotions, removing the need for enforcement via traditional means. Similarly, the technology can be applied to crowdfunding companies such as Kickstarter, and when the Fund-raiser's required amounts are reached, it gets verified by the participants, the payment is released, and the transaction is added to a blockchain.

[44] Ibid

CHAPTER – 2.3 | OPPORTUNITIES AND ADVANTAGES

Blockchain innovations open novel avenues for achieving supply chain traceability and bringing transparency. But it is essential to remember that Blockchain needs to work as a part and parcel of a system requiring a mandate of due diligence and compliances with Human Rights standards to show efftolts. The following are the advantages it possesses –

1. Blockchain technology can improve the knowledge and reach of companies into their supply chain and can be more involved with their stakeholders. This results in conducting the due diligence and rectifying the Human Rights violations in the supply chain.[45]

   Today, suppliers reside across the globe for any normal regular supply chain. The international supply chains are fragmented often involved numerous countries. Traceability can become challenging after 1 or 2 levels down the supply chain. With the introduction of blockchain's trusted and decentralized mechanism for logging the commodity details throughout the supply chain, it could aid businesses attain greater visibility into all the stakeholders they are involved with and enable them in identifying risky suppliers quite easily. The biggest advantage Blockchain offers is the real-time traceability aspect. It allows every stakeholder to have a record of the complete Blockchain and note the future transactions – hence, the administrative load of traceability gets drastically reduced. It makes due diligence a regular affair by continuously monitoring al the suppliers for any red flags instead of making it a one-time formality or any periodic function.

[45] "Blockchain: Beyond Bitcoin into Agriculture." August 2, 2017. Gro Intelligence. https://gro-intelligence.com/insights/blockchain-in-agriculture.

2. Blockchain brings in transparency in the businesses over their supply chains by empowering them to record the data in an immutable format – protecting against the interference and enabling third party observers to notice discrepancies.[46]

   Blockchain's data is stored in a highly resistant to tampering decentralized and distributed format, all the stakeholders of the supply chain and the external parties can ensure trusting the details recorded on it. No one is in the capacity to manipulate it. The information recorded in the automated data collection process of Blockchain is tough to infiltrate with in comparison with the physical book or conventional computer records as they are usually accessible to only the main producer for a substantial time before they are passed to a regulator or a third party.

3. Blockchain can decrease the overall expenditure of the functioning of supply chain traceability initiative and fosters expansion by allowing different stakeholders to actively participate.

   The costs incurred in improving the supply Chan tracking system is a significant hinderances. The Blockchain technology can help reduce the costs borne by the produced in several manners.[47] Blockchain's traceability factor would lead to cost savings as it will reform the electronic record keeping. It can eliminate the redundancy of recording data by operating on one common platform for uploading and

[46] Ge Lan, Christopher Brewster, Jacco Spek, Anton Smeenk, and Jan Top. "Blockchain for Agriculture and Food: Findings from the Pilot Study." Wageningen Economic Research pilot study, (November 2017)

[47] Zambrano, Raúl, "Blockchain: Unpacking the disruptive potential of block- chain technology for human development." International Development Research Centre (August 2017).

standardizing the data sets which are required for the producer to maintain. Blockchain enabled smart contracts can further help in decreasing the costs by enabling the companies to automate specific transactions and processes without the need of relying on any legal intermediary.[48] It helps in the decreasing the load of auditing because the data being uploaded on the Blockchain easily allows the consumers, regulators and certification authorities to directly look into the transactions.

[48] Pisa, Michael and Matt Juden. "Blockchain and Economic Development: Hype vs. Reality." Center for Global Development Policy Paper 107, (July 2017).

CHAPTER – 2.4 | CASE STUDY – SEA QUEST FIJI[49]

The World Wildlife Fund for Nature (WWF) and Viant (a Blockchain developer), TraSeable (an ICT provider) and Sea Quest Fiji (a fishing company) collaborated for a project to commence tuna fishing but by using blockchain for tracking the tuna.[50] They started tagging the tuna which were caught the ships and uploaded the details of each tuna on a blockchain.[51] As each tuna passed through the supply chain, its tag is supposed to be scanned at regular check- points for recording all the key details - time, date, and GPS location at every step in the supply chain process. After the fish were processed and packed, those Quick Response (QR) codes enabled the tune to be tracked even by the end consumer with all details being recorded publicly. In addition to source of origin data, the Blockchain network also logged the accredations earned by the company as a proof for responsible fishing.[52]

It was noted by the company that they were more able to be quite more effective and secured than the conventional technologies like barcoding. The former system could be easily manipulated and could not display the same volume and diverse sets of data. Additionally, the fishing company pointed that their job of recording information automatically helped them in decreasing the probable risk of influencing it as it removed any scope for the workers to control the kind of data entered in the network. It also helps track the status and conditions of the workers on the ship.[53] WWF concluded that this blockchain project can be lucrative for

[49] Supra note 18.

[50] Ibid.

[51] For an example of a fish logged this way, see "FJ00001," Traseable Solutions, n.d., https://www.traseable.com/story/FJ00001/.

[52] "Strengthen your certification with the latest tech," OpenSC, n.d., https://opensc.org/certifications.html.

[53] "Illegal Fishing and Human Rights Abuses at Sea: Using Technology to Highlight Suspicious Behaviors," Oceana, June 2019, https://usa.oceana.org/publications/reports/illegal-fishing-and-human-rights-abuses- sea#.

traceability action because of its immutability aspect and its power to make it stricter to hide details by breaking down details in sets.

The company also observed that this system made it easier for the observers like the Fiji labor Department for confirming their production records and help them in creating trust in the credibility of collected data. This system also enabled the company to expand and include details about their crew, live ships tracking, and many other data that may be mandated by the regulators.[54]

We need to also understand the overall experience faced by the shipping company as they faced certain challenges while using Blockchain for their traceability initiative.[55] They struggled with the Radio Frequency Identification (RFID) tags which they had used for their initial project because they have negligible regional expertise in procuring, installing, and maintenance of the RFID system. Subsequently, they ended up removing RFID tags and transferring to QR codes. They also evaluated a potential of shifting to the Near Field Communication (NFC) tags as the next alternative.

The project provides vital learning as it highlights the importance of cooperation from all the stakeholders throughout their entire engagement in the complete supply chain.[56] Without the involvement of the downstream stakeholders and their consent in the traceability project, this initiative is not possible to be undertaken.

[54] Jason Judd, "Beneath the Surface: A review of literature and initiatives for identification of forced labour in fishing [Draft]," Cornell, February 2020, https://cornell.app.box.com/s/pdawct980a8m64aeiz4qma5uzyjgo94u; and Chow et al., "Supply Chain Human Rights Risk Management."

[55] Ibid.

[56] "Blockchain for Traceability in Minerals and Metals Supply Chains: Opportunities and Challenges," RCS Global, December 20, 2017, https://www.rcsglobal.com/wp-content/uploads/2018/09/ICMM-Blockchain- for-Traceability-in-Minerals-and-Metal-Supply-Chains.pdf; and Chow et al., "Supply Chain Human Rights Risk Management."

CHAPTER – 2.5 | RISKS AND LIMITATIONS

The introduction of Blockchain technology for supply chain traceability initiatives should not outweigh the more significant task of creating devices, systems, legislations and organizations ensuing due diligence is done by monitoring the Human Rights conditions — an issue which Blockchain can't tackle alone.[57] The following are the potential risks and limitations of using Blockchain technology for traceability in the supply chain –

1. Depended on the type of information recorded, the workers might face the risks to their privacy and could be subjected to retaliation by their employer.

   In the case wherein if any Blockchain network records the details of the workers and by the workers then it might be a possibility that they could risk their personal information become vulnerable to any kind of retaliation by their employers for alerting an abusive working environment. It is paradox as this is a potential risk to workers' privacy in the case if their information would be recorded as part of the tracking initiative meant to track and ensure the workers' well-being.[58]

   Whenever the workers' biometrics and details of work profile will be captured, this will present a potential risk to privacy. This risk could be avoided by making sure that the workers do not record their biometric data directly in the blockchain. Instead, it guarantees only the result of workers be checked by the third parties. But even if there

[57] Kenny Li, "The Blockchain Scalability Problem and the Race for Visa-Like Transaction Speed," Hackernoon, January 26, 2019, https://hackernoon.com/the-blockchain-scalability-problem-the-race-for-visa-like- transaction-speed-5cce48f9d44.

[58] Bradley Soule, "Blockchain technology – Could this be the supply chain's weakest link?," Open Channels, August 20, 2018, https://www.openchannels.org/blog/oceanmind/blockchain-technology-could-be-supply-chains-weakest-link.

is no recording done of biometrics, the Blockchain system can still make sure that any kind of pseudonymous identifiers cannot be traced back to any of the workers which might reveal any details about them.

2. Blockchain traceability might require certain kind of technological infrastructure which might not be available with small or medium scale companies.

   To get effective and holistic results out of the Blockchain traceability initiative for the supply chains, all the producers/suppliers involved in the supply chain should ideally be a part of the network throughout. And to participate in this initiative, all the stakeholders need to have the provision to avail all the resources including the tools, devices and tech-connectivity necessary to link themselves to the international Blockchain network. For a lot of small--medium tier companies, especially the ones that operate at the end of the supply chain, have no access to these technological prerequisites.[59] A huge section of these suppliers still use that paper-based systems for logging the supply information. To encourage such stakeholders of the supply chain to tag along on the Blockchain network would require significant investment in resources such as time and capacity building which could slow down the process and make the traceability efforts less effective.

[59] Ibid.

CHAPTER – 2.6 | CONCLUSION

Blockchain technology provides a fruitful opportunity but with a substantial responsibility for the stakeholders who aim to work on the issues of labor in global supply chain. It provides a unique insight into conducting an in-depth due diligence and aids in maintaining the compliance with Human Rights standard by evaluating the risk that the corporation might cause, fuel to or could be traced to through their business operations.[60]

The basic limitation that is observed in the Blockchain initiative for traceability is that it might not be able to automatically reform the visibility in the matters whether any particular supplier in the chain is involved in an abusive behavior (violating human rights). Blockchain does provide a benefit by immutably linking the data to stakeholders – resulting the derivation of insights easily accessible. But this system is only helpful when the key challenge of collecting the data with accuracy and reliability is completed successfully.

Because the Blockchain can only assures the integrity of data on it only after it is uploaded and not before. Hence, the government and global policies still needs to address the topic of 'garbage-in and garbage-out' because it cannot prevent a wrong data from being uploaded by corporations that wish to escape supervision or cover their illegal behaviour.[61] But it can make it easier to recognise and investigate into such falsified data. Because of its transparent and immutable nature of recording, the third parties can have an easy access for conducting audits for verifying the credibility of data uploaded by the stakeholders. This gives high chances of the producers that regularly record false data will eventually be identified and held liable.

[60] Supra note 48.

[61] Supra note 49.

CHAPTER – 3.0 | BLOCKCHAIN FOR DIGITAL RIGHTS

Digital solutions designed for identity purposes have the goal to raise the access and strengthen the credentials used for recognition – these are required globally for accessing the common goods and services offered by the government. Today, around one billion people face hindrances in the process of acquiring government backed official identification.[62] Majority of those unfortunate individuals belong to the global south residing in Africa and South Asia's low- and middle-class-income nations.[63] Among them there are a specific type of individuals who often find it highly challenging to obtain a legal identity i.e., Refugees. Today, there are over 26 million refugees in the world.[64] Majority of the refugees usually have lost their original identity documentats because of a conflict, war or natural disaster.

The people who got denied from the government identity systems are now facing humongous barriers in getting reintroduced to any normal state and their stable social and economic systems.[65] E.g., an individual would require an official ID like passport for opening a banking account. Without a bank account, that individual will not be able to get any apartment for residence. Without a proper lease or any documentation demonstrating a legit proof of residency, that individual will get troubles in getting a job. This way, because of the absence of a basic identification documents, it can lead a refugee in a cascading chain of challenges

[62] Vyjayanti T Desai, Anna Diofasi, and Jing Lu, "The global identification challenge: Who are the 1 billion people without proof of identity?," World Bank, April 25, 2018, https://blogs.worldbank.org/voices/global-identification-challenge-who-are-1-billion-people-without-proof-identity.

[63] Ibid.

[64] Supra note 18.

[65] Elisa Perrigueur, Vera Deleja- Hotko, Franziska Grillmeier, and Katy Fallon, "Prisons in paradise: Refugees detentions in Greece raise alarm," Al Jazeera, October 22, 2021, https://www.aljazeera.com/news/2021/10/22/prisons-in-paradise.

which violates the Human Rights as it restricts the individuals to avail an access to the essential benefits and services.

What does Digital Identify mean for Human Rights?

Any identify issued by a credential authority or institution can act as a basis for availing numerous rights. The introduction of Blockchain as a medium for maintaining digital identity can influence numerous rights, especially the following –

1. **Right to Privacy**

   Article 12 of the UDHR[66] and Article 17 of the ICCPR provides everyone the right to privacy.[67] To guarantee the fundamental right to privacy, the protection of personal data is crucial. Millions of migrants and refugees around the globe face the challenges of securing their right to privacy when they have to work with border authorities and International Originations (IOs). Because these authorities look for basic details of the refugees which includes biometrics, any kind of valid documentation remaining, social media content and other data points which can help them in determining the eligibility for admission and tracking their actions upon arriving.

2. **Right to Asylum**

   Article 14 of the UDHR[68], with reference to the Convention Relating to the Status of the Refugees, enshrines the right to asylum as well as the principle of non-refoulment i.e., the prohibition on forcing the refugees to forcibly return to a country wherein

[66] Article 12, the Universal Declaration of Human Rights.

[67] Article 17, the International Covenant on Civil and Political Rights.

[68] Article 14, the Universal Declaration of Human Rights.

his/her life and freedom are threatened.[69] There are several reasons for claiming an asylum like forced displacement, persecution, armed conflict or war – these are also the reasons which can render the refugees separate from their official identification documents. The lack of a global consensus on how to establish an identity in the case of undocumented migrants or refugees has been undermining the verification of the asylum seekers' claims for protection.

3. Right to Equality

Article 2 of the UDHR and Article 2 of the ICCPR prevents non-discrimination and describes the right to equal rights. Article 26 of the ICCPR enshrines the equality before the law and equal protection by the law without any discrimination.[70] Usually, a migrant or refugee is denied an access to protection under the law because of the lack of an uncredentialed status. E.g., it has been reported that the Greek border authorities have been illegally hindering the migrants from accessing the legal services which they require the most to claim asylum.[71]

[69] "The principle of non-refoulement under international human rights law," UN Office of High Commissioner on Human Rights, n.d., https://www.ohchr.org/Documents/Issues/Migration/GlobalCompactMigration/ThePrincipleNon-RefoulementUnderInternationalHumanRightsLaw.pdf.

[70] Clara Long and Ariana Sawyer, "'We Can't Help You Here' US Returns of Asylum Seekers to Mexico," Human Rights Watch, July 2, 2019, https://www.hrw.org/report/2019/07/02/we-cant-help-you-here/us-returns- asylum-seekers-mexico#.

[71] "Types of ID Systems," World Bank, Identification for Development Practitioner's Guide, n.d., https://id4d.worldbank.org/guide/types-id-systems.

CHAPTER – 3.1 | THE NEED

The underlying value behind any credential is based on the level of trusts people have on the authority that issued the identification document. E.g., when a government issues an ID card then the trust put on that credential is far more than any other ID card. It is because it is very difficult to falsify any documentation which is issued by a reliable and authoritative institution like the government.

Any credential is tied to an individual through the usage of identity systems. E.g., an ID card issued for the government can be associated with the identity established for an individual via the civil registry. This can be referred to as a basic ID system wherein it gives a tangible proof of identity enabling the person holding the ID to avail a broad range of public and private service backed by an authority.[72] On the other hand, a social media account is more of a functional ID which can serve to authenticate its user for particular and limited uses. Interestingly, these both ID cards are issued in a centralized manner with one particular authority issuing and providing it to different individuals in any country.

Introduction of Blockchain technology for digital identity initiatives can give the chance of removing such hindrances by providing the tech-infrastructure for a novel type of ID system named as Self Sovereign Identity (SSI).[73] Here, the SSI management enables the people to maintain their identity details and not rely on any centralized party. SSI has the potential to provide people with significant control over their data. It supports the individuals without any official ID to create a new record of identity for themselves. It is integral to note that SSI will

[72] "Decentralized Identifiers (DIDs) v1.0," W3C, August 3, 2021, https://www.w3.org/TR/did-core/.

[73] Fennie Wang and Primavera De Filippi, "Self-Sovereign Identity in a Globalized World: Credentials-Based Identity Systems as a Driver for Economic Inclusion," Frontiers in Blockchain 2 (January 2020), doi:10.3389/fbloc.2019.00028; and "Blockchain Identity Management: The Definitive Guide (2021 Update)," Tykn, May 19, 2021, https://tykn.tech/identity-management-blockchain/.

not be able to contribute to better data governance without the presence of a robust legal and regulatory system.

How to introduce Blockchain in Digital Identity initiative?

Defenders of Blockchain accept that the innovation might offer the possibility to address a significant number of these issues by filling in as the specialized framework for another sort of character framework named "Self-Sovereign Identity," where identification documents and certificates are stored and constrained by clients as opposed to by local authorities.[74] The main useful advantage of SSI is that it allows people to construct a holistic record of character from the available informal sources. E.g., SSI might make it simpler for the refugees from the camps to take the health information, educational qualifications, and professional certifications gathered through their engagement with IOs and utilize them subsequently after leaving the camp. Technically, these credentials worth would be evaluated and finalized by the receiving party's subjective consideration. While SSI might make it simpler for people to lay out a trust-based connection between themselves and these functional credentials – there is a need for political and legal reform before the masses initiate utilizing these credentials for foundational identity purposes.

SSI likewise guarantees upgrades to protection by making the conglomeration of individual data by incorporated regulators superfluous and engaging clients to control their character data.[75] The security advantages of SSI are subverted, notwithstanding, on the off chance that

[74] Adam Piore, "Can Blockchain Finally Give Us The Digital Privacy We Deserve?," Newsweek, February 22, 2019, https://www.newsweek.com/2019/03/08/can-blockchain-finally-give-us-digital-privacy- we-deserve-1340689.html; Greg McMullen, Primavera De Filippi, and Constance Choi, "Blockchain Identity Services: Technical Benchmark of Existing Identity Systems," Blockchain Research Institute and Coalition of Automated Legal Applications, July 2019, https://app.hubspot.com/documents/5052729/ view/68912918?accessId=6d30db.

[75] Christopher Kuner and Massimo Marelli, eds., Handbook on Data Protection in Humanitarian Action. International Committee of the Red Cross (Washington, DC: ICRC, June 2020), https://www.icrc.org/ en/data-protection-humanitarian-action-handbook.

any private data is put away straightforwardly on the blockchain, because this data can never be erased and hence would make a long-lasting gamble to the singular's protection. Further, because a few weak populaces might not approach the cell phones expected to store computerized qualifications, these people will probably wind up depending on outsiders to have their personality wallets. This relationship makes various potential dangers relying upon the strategies and practices of the overseer and the degree of control the client can apply. At long last, while SSI might empower better information administration rehearses by limiting the requirement for outsiders to gather data about clients while confirming their personality, missing solid legitimate assurances, there isn't anything halting states, organizations, and, surprisingly, thoughtful society associations from proceeding to gather and use data about people in manners that disregard their privileges.

In the compassionate area, the utilization of SSI might assist with working on the organization of help programs by permitting associations to team up more productively and diminishing how much information each gathering gathers about the people it serves. Notwithstanding, these advantages require defeating various specialized, functional, and political obstructions to coordination and would need to be painstakingly organized to abstain from barring any people while dealing with the difficulties of custodianship.

Blockchain-based SSI frameworks might assist with further developing admittance to personality documentation and address the security dangers of incorporated computerized character frameworks, however provided that people are allowed genuine command over their data and have the instruments to get to it. Missing huge upgrades in innovation access, computerized education, and lawful assurances, this will be improbable in numerous settings. Dependable organizations would require cautious regard for the huge dangers implied and would expect that both the specialized design and particularly the framework's administration

cycle be painstakingly built to oppose misuse and focus on the necessities and interests of the clients. Therefore, while building SSI frameworks might be advantageous, to introduce this innovation in initiatives without satisfactory legal and administrative backing, ought to be drawn closer with outrageous doubt.

CHAPTER – 3.2 | CASE STUDY | IRESPOND[76]

iRespond, an international nonprofit organization, is working on creating a digital identity solution based on biometrics for healthcare providers, civil society groups, and government officials.[77] Its system uses biometrics (mainly iris) to create a unique twelve-digit digital ID for individual user. It can also use fingerprint or facial recognition depending on circumstances. They are stored on the cloud and tagged to an encrypted hash of the individual's biometric template. It allows users to securely check any linked identity details at the same time limits on the collection of personal details.

This is introduced so far in 7 states in Africa and Southeast Asia. It was a pilot project with the International Rescue Committee (IRC) in the Mae La refugee camp (Thailand).[78] Over 40,000 refugees from Myanmar reside in that camp. The objective was to better the administration of health services provided to refugees. iRespond enabled refugees to validate themselves at health centers of the refugee camp by simply consenting to an iris scan instead of using the old paper IDs. As soon as the system is integrated, a quick scan will directly open the patient's health records electronically. It can give the health practitioner a solid assurance that that the health records belong to that patient only.

iRespond also provided records through this program for birth attestations. To record births in the camp, iRespond designed a project that provides both physical-paper and digital-birth attestation credentials to the family.[79] The data logged on their blockchain included the

[76] Supra note 18.

[77] Ibid.

[78] "About iRespond," iRespond, n.d., https://www.irespond.org/.

[79] Alex Andrade-Walz, "From stateless to self-sovereign: A project that gives life-long identity to the world's invisibles beginning at birth," Biometric Update, July 23, 2020, https://www.biometricupdate.com/202007/ from-stateless-to-self-sovereign-a-project-that-gives-life-long-identity-to-the-worlds-invisibles-beginning- at-birth.

identifiable detail of both i.e., the mother and the child. This allows them to prove to third parties that they have a link to that credential. The family can use this digital data for recovering a physical copy of the birth certificate as well.

iRespond did not collect or saved any personal identifiable detail or health record of any individual.[80] The scan of iris of the individuals were deleted as soon as they get enrolled on the system. No kind of non-biometric personal details were collected because the unique ID makes it unnecessary. Now onwards, the pseudonymous ID of the people is only required track and record details about them. The additional benefit of this system is that the organization now cannot be coerced by governments to provide details about the people they serve.

The final goal of iRespond is that the blockchain database they are building is not just used not for health records electronically - but they are a repository for refugees to consolidate other types of credentials/records like immunization, professional training certifications, and education qualifications.[81] Any individual with a smartphone can store these credentials directly in the application. Infact, for the people without a smartphone, they are given a physical copy of a QR code which is used as an analog backup. In their digital accounts maintained on their wallet will hold the documents till the refugee gets a smartphone. In any case, the organization stores a copy of the documentation if the refugee loses their access to the wallet application.

[80] An example of one of these birth attestation credentials may be found at https://www.irespond.org/ birthlink.

[81] Interview with iRespond; "About iRespond," iRespond; and Piore, "Can Blockchain Finally Give Us Digital Privacy We Deserve?"

CHAPTER 3.3 | OPPORTUNITIES AND ADVANTAGES

1. The Blockchain technology can enabled digital identity systems i.e., SSI to help people, like migrants and refugees lacking official documentation, by creating a digital account of identification from unofficial sources.[82]
2. Blockchain can aid in safeguarding privacy of the individuals by limiting and reducing the aggregation of personal details by data controllers and by reforming people's ability to manage how their data is shared.[83]
3. Blockchain can help protect against the loss of identity documents because of natural disasters or conflict.[84]
4. Blockchain can help in improving the administration of humanitarian aid to vulnerable populations.[85]

[82] Matthew Davie, "Kiva's next frontier: Kiva Protocol," Kiva, n.d., https://www.kiva.org/blog/kivas-next-frontier-kiva-protocol; and Wang and De Filippi, "Self-Sovereign Identity in a Globalized World."

[83] Equifax Data Breach," Electronic Privacy Information Center, n.d., https://epic.org/privacy/data-breach/equifax/.

[84] Slavin, Putz, and Korkmaz, Digital Identity; Partnership for Maternal, Newborn & Child Health, "Digital Opportunities for Displaced Women, Children and Adolescents," WHO, 2019, https://www.who.int/pmnch/media/news/2019/PMNCH-knowledge-brief-2.pdf?ua=1; Schoemaker et al. "Identity at the margins"; and Karthik Muralidharan, Paul Niehaus, and Sandip Sukhtankar, "Building State Capacity: Evidencefrom Biometric Smartcards in India," American Economic Review 106, no. 10 (October 2016), doi:10.1257/ aer.20141346.

[85] "Building Blocks: Blockchain for Zero Hunger- Graduated Project," World Food Program, n.d., https://innovation.wfp.org/project/building-blocks.

1. This move of digital identities with the help of blockchain-based identity system might make certain services inaccessible for those without the digital IDs.[86]
2. Blockchain can lead to bringing more risks to privacy if personal details are stored directly on the blockchain network.[87]
3. SSI systems might need individuals to rely on civil societies as custodians of their IDs and documentations at a time when individuals who themselves cannot manage their identity details.[88] This reliance might attract risks if blockchain systems are not structured properly.

[86] "Exclusion by design: how national ID systems make social protection inaccessible to vulnerable populations," Privacy International, March 29, 2021, https://privacyinternational.org/long-read/4472/ exclusion-design-how-national-id-systems-make-social-protection-inaccessiblle.

[87] Vindu Goel, "Indian 'Big Brother' using fingerprint identification system for food, benefits and bank accounts," The Independent, April 10, 2018, https://www.independent.co.uk/news/world/asia/india-tech- fingerprint-eye-scan-id-food-benefits-bank-accounts-a8297391.html.

[88] Rina Chandran, "Ten years on, India's biometric ID excludes homeless, transgender people," Reuters, November 26, 2019, https://www.reuters.com/article/us-india-tech-digitalid/ten-years-on-indias- biometric-id-excludes-homeless-transgender-people-idUSKBN1Y012X.

CHAPTER – 4 | RECOMMENDATIONS

The introduction of Blockchain for human rights can have various implications can could carry risks as well. This recommendations are for the consideration of IOs, civil society organisations, companies and governments in oder to internalize it in their practices to reduce the human rights risks.

According to the UNGPs, all the corporations have an obligation towards ensuring Universal Declaration of Human Rights.[89] They have to exercise human rights due diligence by keeping effective governance policies and practices for identifying and addressing their value chain is making on the human rights. Compliance to the human rights standards include analysing the current and future human rights impacts – understanding the findings, having plan of action, tracking responses, and following up on how impacts are addressed.

The responsibility of the corporate to respect human rights is standalone of whether governments enforce human rights compliant laws or not. The relationship between the companies' responsibility to adhere to human rights standards and the existing human rights obligations of governments are interrelated. As per the UNGPs commitment, the governments duty is to protect human rights from adverse impacts of third parties like companies.[90] Hence, there should be in place strict laws, enforcement agencies, regulators and legal remedy mechanisms to deal with all the stakeholders including the corporations who are involved in blockchain development.

[89] United Nations Human Rights Office of the High Commissioner, Guiding Principles on Business and Human Rights (New York: United Nations, 2011), https://www.ohchr.org/documents/publications/guidingprinciplesbusinesshr_en.pdf. The UN Human Rights B-Tech project provides further authoritative guidance on how the UNGPs can be implemented in the technology sector. See: "B-Tech Project," UN OHCHR, n.d., https://www.ohchr.org/EN/Issues/Business/Pages/B-TechProject.aspx.

[90] One representative set of questions that can be used to guide this assessment can be found at "Blockchain – Questions," CivicSpace.tech, n.d., https://www.civicspace.tech/technologies/blockchain/#questions.

Analysing Human Rights Impacts and Risks

1. There is to be conducted a general assessment for determining the overall human rights impacts and influence of the products and services in the society.
2. The organization must have their internal institutional structures and process systems for recognizing and addressing the human rights issues raised by the company's commodities in the market.
3. There should be created an external advisory body with representatives belonging from a diverse range of sectors for providing an outsider's point of view on the potential risk of the company's products and methods to maximize the potential benefits.
4. There should be a through due diligence conducted of potential buyers and partners to assess the risk of deployments leading to human rights abuses.

Redressing Human Rights challenges

1. The blockchain developing organisations should leverage their contractual power and or influencing mechanisms for establishing processes in place and for regularly reviewing the customer are using the tools being provided to them.
2. They should safeguard the technical structure of the blockchain network and its complete digital ecosystem should ensure decrease in privacy and security risks.
3. There should be made available a training session for users to help operators understand the use the blockchain technology in manner that respect human rights practices.

CHAPTER – 5 | CONCLUSION

This is certain that it is too early to determine and come to the conclusion over the results of the impact on adoption of blockchain initiatives for social impact. However, we have already been undertaking case studies which tells us that a true picture beyond the hype. As these blockchain applications mature, here are main two conclusions from our research -

Attention to detail on the impact of blockchain toward social impact.

As more and more blockchain-based initiatives are commenced, there is a need to closely monitor their development and support them to ensure that they prove correct on the use cases they have been designed to take up. There is already an impact noted in domains of democracy and governance; supply chain and digital rights. As the blockchain initiative move toward adoption and leaves an impact in the society, we are learning about its potential that to address the current and future human rights challenges.

Analyse the problem first independent and map blockchain's values

Blockchain has the power to bring trust between numerous parties, decrease costs, foster efficiency, and bring security. As demonstrated in the research, blockchain bring innovativeness and futuristic solutions. Blockchain technology has the potential to enable solutions that otherwise would not be possible with normal technologies.

To check if blockchain technology can be used for your initiative, the Deloitte Blockchain Framework offers general guidance on main four pre-conditions for which blockchain technology would be best suited:

- Situation involving multiple parties generating transactions that influence data stored in a shared repository.
- All parties need to have the trust over the fact that the transactions are valid.
- Issues wherein the intermediaries are inefficient and could not be trusted.
- Matters wherein enhanced security is required.

It is to note that blockchain technology has also been hyped often by people who are always in search for using a new technology for the sake of using it. Instead of treating blockchain as a technology in search of its application, there is a need to address the actual issue – 'To determine if blockchain technology's attributes can be of value or not'. When a deep focus will be put on how blockchain technology can add value to address the human rights issues, it will bring the solution closer to reality.

CHAPTER – 6 | BIBLIOGRAPHY

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