iS
CHANNEL

Making Sense of Blockchain Technology in the Humanitarian Sector: A Case Study Analysis of 'Building Blocks'

Luise Perlitt

MSc Management of Information Systems and Digital Innovation
Department of Management
London School of Economics and Political Science

KEYWORDS

Humanitarian Blockchain

Refugee Camps

ABSTRACT

Due to the decentralised, distributed and immutable nature of blockchain technology, several benefits arise, such as efficiency, transparency and accountability. Hence, humanitarian organisations began exploring blockchain technology, for instance, to monitor aid funding or improve financial inclusion. However, the implications of humanitarian blockchain are still academically and practically not profoundly understood. The question arises as to how the implementation of blockchain technology shapes the humanitarian sector beyond technical challenges. In light of the different theoretical perspectives on humanitarian blockchain, this paper analyses and discusses the blockchain-based solution 'Building Blocks' initiated by the World Food Programme (WFP) to facilitate aid allocation and eliminate transaction costs in refugee camps. The paper concludes that humanitarian blockchain is not only a socio-technical tool that must be analysed in its context but can be seen as an institutional technology shaping governance and power structures. Thus, humanitarian blockchain has the potential to fundamentally transform the humanitarian sector.

1. Introduction

Blockchain technology has gained notable interest among researchers and practitioners in the past several years. It has mostly been in the hype-cycle of media based on the speculative cryptocurrency market and the potential to disrupt the financial sector (Ko & Verity, 2016). Initially focused on the economic benefits of blockchain, the attention is now shifting towards applications to tackle public, environmental and social issues. For instance, the local government of Estonia has increased research resources on blockchain applications for public record-keeping and voting systems (Ko & Verity, 2016).

The variety of use cases for blockchain technology has also underlined the potential to improve accountability and transparency in the humanitarian aid and development sector (Seyedsayamdost & Vanderwal, 2020). In fact, blockchain technology has been increasingly explored by humanitarian agencies, such as United Nations, High Commission for Refugees (UNHCR), World Food Programme (WFP) and UN Women (Hunt et al., 2022; Kewell et al., 2017; Seyedsayamdost & Vanderwal, 2020).

Use cases being explored range from tracking logistical and service processes, distributing and monitoring aid funding (e.g., Disberse) to securing land registries (e.g., Bitland) and protecting data storing and sharing among humanitarian stakeholders to foster trust and fight corruption (Demir et al., 2020; International Committee of the Red Cross, 2020; Sahebi et al., 2020). In addition, blockchain technology is implemented to create and verify digital identities to improve financial inclusion, for example, by allowing women access micro-loans (Kewell et al., 2017; Zwitter & Boisse-Despiaux, 2018). Most of the existing literature on humanitarian

Corresponding Author
Email Address: luise.perlitt@gmail.com

blockchain, however, focuses on blockchain in humanitarian supply chain management, improving logistical processes that enable effective and fast aid allocation (Baharmand, Maghsoudi, et al., 2021; Dubey et al., 2020; Masudin et al., 2021).

Despite the potential, humanitarian blockchain is still a nascent topic and not well understood from an academic standpoint. The first comprehensive framework to design a humanitarian blockchain project taking multiple stakeholders into account was developed only recently by Hunt et al. (2022). Additionally, most of the projects are in an early ideational stage and have not yet found application in the field.

Further, several scholars criticise humanitarian blockchain as Silicon Valley solutionism which underlines the topic's controversy. Jutel et al. (2022), for instance, state that Blockchain can be seen as 'platform imperialism' that builds on the cultural and economic power of geopolitical interests. Moreover, the two main caveats in implementing blockchain technology in humanitarian management are internet access and a stable infrastructure (Ko & Verity, 2016; Zwitter & Boisse-Despiaux, 2018). Blockchain is associated with high energy consumption and requires a stable internet connection to process transactions. Therefore, in areas with poor energy infrastructure and where the internet is often shut down for various reasons, the technology will eventually reach the limits of scalability (Ko & Verity, 2016).

In this paper, I argue that blockchain technology has vast implications for humanitarian management beyond technical challenges. While blockchain technology is not a panacea for all development ill, it requires more profound studies. Therefore I will explore the following research question: *How does the implementation of blockchain technology shape the humanitarian sector?* To answer this research question, I examine blockchain technology in light of the blockchain project 'Building Blocks' initiated by the World Food Programme.

The paper is structured as follows. The next section presents an overview of the functionality of blockchain technology and how humanitarian blockchain is studied in literature. In section 3, I provide an in-depth outline of the case study 'Building Blocks'. Next, I analyse how the implementation of blockchain technology is shaping humanitarian management and in the following chapter, reflect on the findings in light of the beforementioned theoretical perspectives on humanitarian blockchain. In the last section, I conclude the paper with further remarks.

2. Literature Background: Humanitarian Blockchain

Blockchain relies on distributed ledger technology and is a transactional database shared among multiple entities, for instance, NGOs, local governments and medical service providers (Hunt & Jun Zhuang, 2022; Pedersen et al., 2019). Within a blockchain network, multiple nodes operate collaboratively to secure and maintain immutable, shared, verifiable and accessible transaction records (Khan et al., 2021). The essential element of blockchain is eliminating the need for centralised trusted intermediaries. Therefore, multiple scholars mention benefits for the humanitarian sector, such as lower transaction costs and faster transaction times and increased transparency (International Committee of the Red Cross, 2020; Ko & Verity, 2016).

Blockchain technology is built on a consensus protocol synchronising all nodes in the network and thus ensuring traceability of the records leading to strengthened accountability between involved entities. The consensus protocol is the governance mechanism of the blockchain, which can be either public or private. The main difference resides in identifying the pool of nodes that can participate and make administrative changes to the network (Pedersen et al., 2019). In a

public blockchain, anyone can access and participate (e.g. Bitcoin), which makes the network highly secure, but lacks privacy (Pedersen et al., 2019). Within a private blockchain, however, the access and participation are controlled and customized by specific entities. Since consensus is determined within the network, is more difficult for external entities to confirm the authenticity of the transactions (Pedersen et al., 2019).

Multiple scholars have assessed the use of blockchain technology in the humanitarian sector. Zwitter & Boisse-Despiaux (2018) analyse blockchain in humanitarian management as a tool with its unique benefits and challenges and stress that the design of the humanitarian blockchain should be considered as an outcome of intentional choices (Zwitter & Boisse-Despiaux, 2018). Based on the affordance theory, Kewell et al. (2017) examine how blockchain can contribute to the development goals and consider that the implementation is not purely a technical question but should also be seen in its social and political context. Baharmand et al. (2021) also identify that the most critical barriers are not because of technical issues. The authors establish a framework for designing humanitarian blockchain projects and differentiate between context-, technology- and organisational related requirements.

Another perspective is adopted by Seyedsayamdost & Vanderwal (2020). The authors underline the implications of blockchain technology on governance and power structures within the humanitarian sector. This view is in line with the paper by Davidson et al. (2018). The authors claim that blockchain is more than just a disruptive technological innovation. Blockchain can be considered as institutional technology of governance that allows for new types of organisations to disrupt existing power structures (Davidson et al., 2018).

Lastly, while Hunt et al. (2022) emphasise the potential of blockchain with regard to collaboration and knowledge sharing between multiple disaster relief organisations, McIssac et al. (2019) specifically examine the potential of blockchain technology for refugee relief operations. The authors highlight how the benefits of blockchain in aid allocation and refugee identification will change humanitarian relief work fundamentally.
Due to its unique characteristics, such as immutability and decentralisation resulting in increased transparency and accountability, blockchain technology is an interesting technology to explore in the humanitarian sector. Humanitarian blockchain in literature is mainly addressed from a socially-embedded perspective, taking the application's context into account. Only a few authors, however, have taken a first step to explore the implications of blockchain technology in the humanitarian sector across the board of multiple actors. In this paper, I explore this issue in more depth through the analysis and discussion of the case study below.

3. Case Study: 'Building Blocks'

To overcome the expensive transaction and currency exchange fees when providing people in need with cash transfers, the World Food Programme (WFP) started its first blockchain-based pilot project in Pakistan to provide cash for 100 individuals without financial intermediaries in 2017. Today, 'Building Blocks' is the world's largest blockchain-based project for humanitarian assistance, currently active in two countries targeting over one hundred thousand refugees. 'Building Blocks' was leveraged to support the increasing number of Syrian refugees at the Azraq Refugee Camp in Jordan and the Rohingya refugees in the 'world's largest refugee camp' in Cox's Bazar (Betts et al., 2015; World Food Programme (WFP), 2022).

In response to a crisis, several humanitarian organisations assist and improve the lives of affected and marginalised individuals with food, shelter or education programmes. Based

on private, permissioned blockchain technology, the 'Building Blocks' network enables secure access and delivery of multiple types of assistance from different humanitarian organisations via one access point according to refugees' personal priorities (Hunt & Jun Zhuang, 2022). With 'Building Blocks', it is possible to track the help and services provided, offering an overview of where assistance is still required, reducing redundant efforts, and eventually increasing the well-targeted support (World Food Programme (WFP), 2022). The blockchain-based solution is linked to an optical biometric authentication technology called 'EyesPay'. To access assistance and cash vouchers at the local supermarket, refugees' digital identities, also stored on the blockchain, are checked based on a retina scanner (Russ Juskalian, 2018).

To this date, 'Building Blocks' has processed over 15 million transactions and thus saved over 2.5 million dollar bank fees (World Food Programme (WFP), 2022). Because of the success, 'Building Blocks' was also used in the aftermath of the explosion in Beirut, Lebanon, in 2020, where US$ 56 million in assistance was distributed (World Food Programme (WFP), 2022).

4. Analysis

As mentioned in section 2, the main characteristic of blockchain is decentralisation resulting in trustworthy and secure networks. 'Building Blocks', however, is built on private permissioned blockchains (Programme, 2017; Seyedsayamdost & Vanderwal, 2020). While some scholars argue that the use of private permissioned blockchains limits the potential of disruptive blockchain technology, more interestingly, it raises the question of the responsibility of oversight and governance over the network and stored data (Thylin & Duarte, 2019). Private permissioned blockchains are closed networks where designated actors participate in consensus validation only partially decentralised among known actors. WFP claims on their website that 'the network is neutral without a hierarchy of ownership' (World Food Programme (WFP), 2022). However, this can only be achieved if multiple organisations across several countries embed various databases and collaborate to create a decentralised peer-to-peer network of consensus. As long as the WFP operates the blockchain-based solution alone, it has power over all smart contracts established for cash transfer and records stored and added to the blockchain, increasing the risk of corruption and decreasing the blockchain characteristic of immutability (Baharmand, Saeed, et al., 2021). The benefits of transparency and accountability toward outside oversight can not be ensured. Consequently, one could argue that 'Building Blocks' is not far from previous solutions and could have been solved with traditional databases (Programme, 2017).

In 2019, UN Women was the first other humanitarian organisation to join the project and thus added another independent node to the network (Thylin & Duarte, 2019). Moreover, based on the example of 'Building Blocks' in the aftermath of the explosion in Lebanon, more humanitarian organisations are working together to create a more extensive network of independent nodes and, therefore, enhance the consensus mechanism. However, the problem remains that power and control continue to be locked in certain humanitarian silos (Programme, 2017). Therefore, the power of certain actors is not necessarily removed but shifted from actors, such as local banks, to specific humanitarian organisations.

Further, it is essential to note that the implemented technology cannot be reduced to blockchain alone, it has to be analysed as an assembly of technologies, including biometrics, blockchain and AI (Madianou, 2019a). To verify their identity, refugees have to store their biometrical information in the form of digital identities, which allow WFP to track their actions. Besides risks, such as potential false matches, and ethical issues, such as concerns about beneficiaries' perceptions, there is an increasing risk of

surveillance of malicious actors capitalising on the technology as an element of control and function creep (International Committee of the Red Cross, 2020). Hence, there will always be a trade-off between deploying such technologies and potentially reducing barriers to actors exploiting the system and using it for non-humanitarian purposes.

On the same note, blockchain technology is not entirely secure due to its novelty. There may be issues in the 'Building Blocks' network that are currently unknown to WFP and could be potentially exploited and misused (Programme, 2017). These issues are not negligible and need to be directly addressed by humanitarian organisations working with blockchain-based solutions, in particular, taking into account that data stored on the blockchain contains sensitive data with identifiable information and belongs to a highly vulnerable population (Bricout & Aurez, 2020).

Lastly, blockchain could shift the power to specific actors in the humanitarian sector or even add new players to the field. Due to the complexity of the technology, there is a risk of a gap in technical literacy (Sahebi et al., 2020). It was reported that 'Building Blocks' lacked guidelines or training on using the technology (Ko & Verity, 2016). Non-experts, either refugees or humanitarian relief workers, could be disempowered because of their lack of understanding which is often also related to misconceptions and myths. While at the same time, more technically savvy people, such as coders and those with high mining capacity, are empowered, resulting in new unbalanced power structures. The argument is linked to the fact that 'Building Blocks' are developed in a top-down approach like most blockchain projects (Thylin & Duarte, 2019). NGOs, governments and big tech corporations come together to innovate. However, it is often disregarded if those novel innovations will be accepted by the people being exposed to the change and involved challenges. Hackathons, for example, can be seen as 'techno solutionism' stemming from a performative entrepreneurial approach and creating a potential dependence on existing platforms and technologies, often discussed in the debate on digital humanitarnism (Jutel, 2022).

5. Discussion

As described in the case study, 'Building Blocks' has many beneficial implications, including enhanced efficiency and transparency. However, although the project was initially set up to increase access to financial resources without the need for banks and therefore, reduce transaction costs, it has broader implications for the humanitarian sector.
Hence, it is a suitable case study to answer the proposed research question: *How does the implementation of blockchain technology shape the humanitarian sector?*

The analysis of the 'Building Blocks' highlights that humanitarian blockchain fosters collaboration and data-sharing between humanitarian organisations. In addition, blockchain technology impacts the humanitarian management approach with regard to governance and control. Power structures may only be re-centralised, and new actors might enter the picture. At this point, the extent, direction and speed of transformation are still unforeseen, but the change is underway.

Reviewing the different perspectives of blockchain technology as explored in the literature background, it becomes clear that humanitarian blockchain must not only be evaluated simply as a technical tool. Blockchain technology needs to be analysed from a socio-technical perspective, taking contextual factors into account to adequately anticipate risks. Most notably, blockchain technology can be seen as an institutional technology that is fundamentally reshaping the humanitarian sector.

6. Conclusion and Further Remarks

Blockchain is a relatively new technology emerging with great speed. Especially

blockchain in the humanitarian sector is at an early stage, and its effectiveness and applicability are yet to be explored. 'Building Blocks' is one of the first and biggest blockchain-based solutions in the humanitarian sector deployed in multiple use cases. In this paper, I argue that while humanitarian blockchain has many benefits, several aspects demonstrate the potential to shape the humanitarian sector more fundamentally, in particular in terms of governance systems and power dynamics. Therefore, this paper does not only provide an overview of the benefits and risks involved with humanitarian blockchain, but also underlines the fundamental transformation of the humanitarian sector.

Due to the scope of this paper, only one case study is explored, limiting the insights' transferability. Yet, the findings of this paper could be in particular valuable for similar blockchain-based solutions. For example, the Finnish Immigration Service has collaborated with a blockchain startup called MONI to improve financial access for refugees (Mike Orcutt, 2017). The analysis provides a basis for practitioners and researchers to explore further humanitarian blockchain and its application from a more holistic perspective.

Further remarks that require more profound analysis are data privacy concerns. An interesting question that should be further explored is whether the right to be forgotten, as stated in the GDPR, also applies to humanitarian blockchain. In addition, the role of marginalised groups in the implementation of blockchain-based solutions should be addressed. Scholars criticise that marginalised groups of people serve as laboratories to test out unexplored technology (Madianou, 2019b). Mainly because those people often live in dependence on humanitarian organisations. What would happen, for example, in a case of a data breach? Would the technology also be tested on a group of European citizens?

Lastly, it is unclear how 'Building Blocks' fits into existing regulatory practices. Further implementation of blockchain in volatile humanitarian contexts is limited due to a lack and fragmentation of legislation and regulatory frameworks (Ko & Verity, 2016; Thylin & Duarte, 2019; Zwitter & Boisse-Despiaux, 2018). Guidelines of who is legally responsible for the data or how regulators will ensure that the network and personal data are secure must be established collaboratively (Ko & Verity, 2016).

7. References

Baharmand, H., Maghsoudi, A., & Coppi, G. (2021). Exploring the application of blockchain to humanitarian supply chains: insights from Humanitarian Supply Blockchain pilot project. International Journal of Operations and Production Management, 41(9), 1522–1543. https://doi.org/10.1108/IJOPM-12-2020-0884

Baharmand, H., Saeed, N., Comes, T., & Lauras, M. (2021). Developing a framework for designing humanitarian blockchain projects. Computers in Industry, 131, 103487. https://doi.org/10.1016/j.compind.2021.103487

Betts, A., Bloom, L., & Weaver, N. (2015). Refugee Innovation Humanitarian innovation that starts with communities. Humanitarian Innovation Project, University of Oxford.

Bricout, A., & Aurez, V. (2020). Solving Humanitarian Aid Inefficiencies with Blockchain Technology. Frankfurt School Blockchain Center.

Davidson, S., De Filippi, P., & Potts, J. (2018). Blockchains and the economic institutions of capitalism. Journal of Institutional Economics, 14(4), 639–658. https://doi.org/10.1017/S1744137417000200

Demir, M., Turetken, O., & Ferworn, A. (2020). Blockchain-based transparent disaster relief delivery assurance. 14th Annual IEEE

International Systems Conference, Proceedings. https://doi.org/10.1109/SysCon47679.2020.9275915

Dubey, R., Gunasekaran, A., Bryde, D. J., Dwivedi, Y. K., & Papadopoulos, T. (2020). Blockchain technology for enhancing swift-trust, collaboration and resilience within a humanitarian supply chain setting. International Journal of Production Research, 58(11), 3381–3398. https://doi.org/10.1080/00207543.2020.1722860

Hunt, K., & Jun Zhuang. (2022). Blockchain for Disaster Management. In Big Data and Blockchain for Service Operations Management (pp. 253–269).

Hunt, K., Narayanan, A., & Zhuang, J. (2022). Blockchain in humanitarian operations management: A review of research and practice. Socio-Economic Planning Sciences, 80, 101175. https://doi.org/10.1016/j.seps.2021.101175

International Committee of the Red Cross. (2020). Handbook on Data Protection in Humanitarian Action, 2nd Edition. International Committee of the Red Cross, 1–312. https://www.icrc.org/en/data-protection-humanitarian-action-handbook%0Ahttps://shop.icrc.org/e-books/handbook-on-data-protection-in-humanitarian-action.html

Jutel, O. (2022). Blockchain humanitarianism and crypto-colonialism. Patterns, 3(1), 100422. https://doi.org/10.1016/j.patter.2021.100422

Kewell, B., Adams, R., & Parry, G. (2017). Blockchain for good? Strategic Change, 26(5), 429–437. https://doi.org/10.1002/jsc.2143

Khan, S. N., Loukil, F., Ghedira-Guegan, C., Benkhelifa, E., & Bani-Hani, A. (2021). Blockchain smart contracts: Applications, challenges, and future trends. Peer-to-Peer Networking and Applications, 14, 2901–2925. https://doi.org/10.1007/s12083-021-01127-0

Ko, V., & Verity, A. (2016). Blockchain for the Humanitarian Sector: Future Opportunities. In Digital Humanitarian Network. https://www.academia.edu/30287787/Blockchain_For_The_Humanitarian_Sector_Future_Opportunities

Madianou, M. (2019a). Technocolonialism: Digital Innovation and Data Practices in the Humanitarian Response to Refugee Crises. Social Media and Society, 5(3). https://doi.org/10.1177/2056305119863146

Madianou, M. (2019b). The Biometric Assemblage: Surveillance, Experimentation, Profit, and the Measuring of Refugee Bodies. In Television and New Media (Vol. 20, Issue 6). https://doi.org/10.1177/1527476419857682

Masudin, I., Lau, E., Safitri, N. T., Restuputri, D. P., & Handayani, D. I. (2021). The impact of the traceability of the information systems on humanitarian logistics performance: Case study of Indonesian relief logistics services. Cogent Business and Management, 8(1). https://doi.org/10.1080/23311975.2021.1906052

McIsaac, D. J., Brulle, M. J., Burg, M. J., Tarnacki, M. G., Sullivan, M. C., & Wassel, M. R. (2019). Blockchain Technology for Disaster and Refugee Relief Operations. Prehosp Disaster Med, 34. https://doi.org/10.1017/S1049023X19002206

Mike Orcutt. (2017). How Blockchain Is Kickstarting the Financial Lives of Refugees - MIT Technology Review. MIT Technology Review. https://www.technologyreview.com/s/608764/how-blockchain-is-kickstarting-the-financial-lives-of-refugees/

Pedersen, A. B., Risius, M., & Beck, R. (2019). A ten-step decision path to determine when to use blockchain technologies. MIS Quarterly Executive, 18(2), 99–115. https://doi.org/10.17705/2msqe.00010

Programme, G. D. I. (2017). Blockchain for Development: Emerging Opportunities for Mobile, Identity and Aid. In GSM Association. https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/12/Blockchain-for-Development.pdf

Russ Juskalian. (2018). Inside the Jordan refugee camp that runs on blockchain - MIT Technology Review. MIT Technology Review. https://www.technologyreview.com/s/610806/inside-the-jordan-refugee-camp-that-runs-on-blockchain/

Sahebi, I. G., Masoomi, B., & Ghorbani, S. (2020). Expert oriented approach for analyzing the blockchain adoption barriers in humanitarian supply chain. Technology in Society, 63, 101427. https://doi.org/10.1016/j.techsoc.2020.101427

Seyedsayamdost, E., & Vanderwal, P. (2020). From Good Governance to Governance for Good: Blockchain for Social Impact. Journal of International Development, 32(6), 943–960. https://doi.org/10.1002/jid.3485

Thylin, T., & Duarte, M. F. N. (2019). Leveraging blockchain technology in humanitarian settings–opportunities and risks for women and girls. Gender and Development, 27(2), 317–336. https://doi.org/10.1080/13552074.2019.1627778

World Food Programme (WFP), I. A. (2022). Building Blocks Blockchain network for humanitarian assistance. https://innovation.wfp.org/project/building-blocks

Zwitter, A., & Boisse-Despiaux, M. (2018). Blockchain for humanitarian action and development aid. Journal of International Humanitarian Action, 3(16). https://doi.org/10.1186/s41018-018-0044-5