Moderating the Hype

Does the "Blockchain for HSCM" narrative reflect reality?

Elise Racine, MSc Health & International Development

Introduction

Humanitarian crises are becoming more frequent, complex, & protracted with severe human & economic consequences.

+

Supply chains have become more global, complex, & vulnerable to crises, which is concerning considering the importance of logistics to disaster response.

+

Blockchain? Initially popularized by the hype surrounding Bitcoin, blockchain technology has been increasingly proposed as a possible solution to these problems.

But in practice, business-driven technologies have high failure rates in disaster settings. This research critically examines the claims around blockchain for humanitarian supply chain management (HSCM) and to what extent it is grounded in the realities of post-emergency response and recovery—which differs substantially from commercial supply chain management (SCM). Its purpose is to support ethical, sustainable, and suitable blockchain implementation in the humanitarian sector.
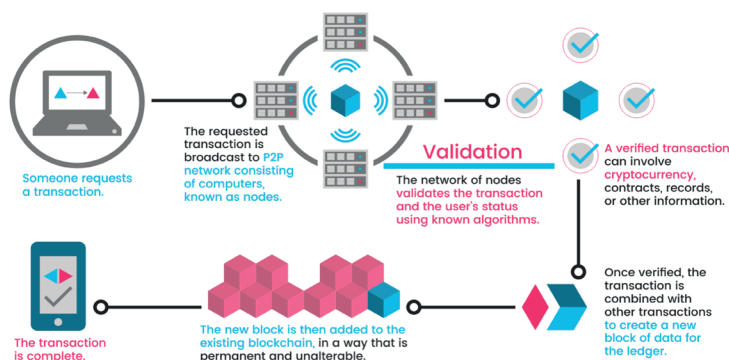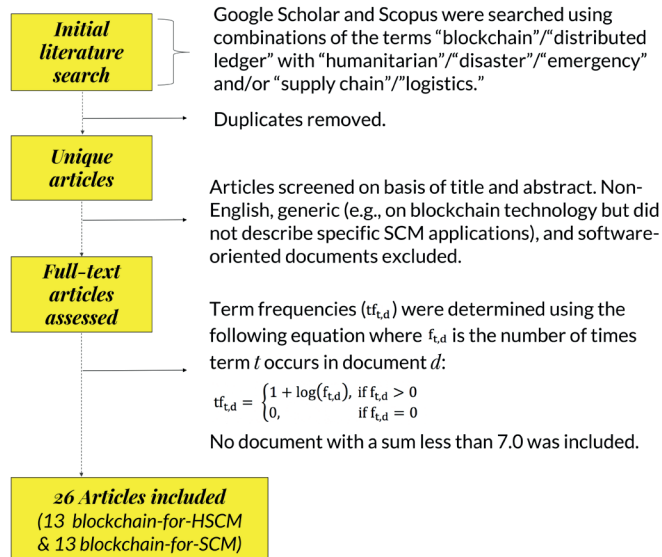

Someone requests a transaction.

The requested transaction is broadcast to P2P network consisting of computers, known as nodes.

Validation
The network of nodes validates the transaction and the user's status using known algorithms.

A verified transaction can involve cryptocurrency, contracts, records, or other information.

The transaction is complete.

The new block is then added to the existing blockchain, in a way that is permanent and unalterable.

Once verified, the transaction is combined with other transactions to create a new block of data for the ledger.

Figure 1. How blockchain works   Source: Blockgeeks, 2016

Key Findings

1. Many blockchain-for-HSCM narratives adopt an idealized perspective of the technology that fails to holistically consider (a) the socio-technical interactions in HSCM and (b) central humanitarian and development challenges.

2. Commercial SCM is often the dominant lens through which HSCM is examined, despite vast differences in the core competencies and operational environments of humanitarian and private sector supply chains.

Methodology

Google Scholar and Scopus were searched using combinations of the terms "blockchain"/"distributed ledger" with "humanitarian"/"disaster"/"emergency" and/or "supply chain"/"logistics."

Initial literature search

Duplicates removed.

Unique articles

Articles screened on basis of title and abstract. Non-English, generic (e.g., on blockchain technology but did not describe specific SCM applications), and software-oriented documents excluded.

Full-text articles assessed

Term frequencies ($\mathrm{tf}_{t,d}$) were determined using the following equation where $f_{t,d}$ is the number of times term t occurs in document d:

$$\mathrm{tf}_{t,d} = \begin{cases} 1 + \log(f_{t,d}), & \text{if } f_{t,d} > 0 \\ 0, & \text{if } f_{t,d} = 0 \end{cases}$$

No document with a sum less than 7.0 was included.

26 Articles included
(13 blockchain-for-HSCM & 13 blockchain-for-SCM)

Discussion

The potential for blockchain-HSCM initiatives to follow and, ultimately, exacerbate the digital divide is especially problematic considering how (a) crises disproportionately impact the poor and (b) much of the responsibility for disaster response and recovery falls on local responders.

*"People exposed to natural hazards in the poorest nations are at least **seven** times more likely to die from them than those in the richest nations" (OCHA, 2019)*

Real world situations "rarely move conveniently and cleanly from relief to development" *(Munslow & Brown, 1999)* and a weak understanding between the two communicates persists.

blockchain for HSCM?

relief ———————————————————— *development*

Blockchain technology is not one-size fits all. Certain characteristics that are often considered absolute and intrinsic to the technology, "such as decentralization, transparency, and immutability, should be understood as outcomes of intentional choices" *(Zwitter & Boisse-Despiaux, 2018)*.

| | | Benefits | | | | | | | Challenges | | | | | | | |
		Transparency	Accountability	Efficiency	Security	Immutability	Decentralization	Trust minimization	Privacy/security	Suitability	Regulatory/governance	Interoperability	Scalability	Technological limitations/immaturity	Limited technical/infrastructural capacity	Recognizes HSCM dynamics
Blockchain for HSCM	Bergquist, 2018	X	X	X												
	Kronqvist, 2017	X		X												X
	Aranda, 2018	X		X	X		X	X			X					X
	Zwitter & Boisse-Despiaux, 2018	X	X	X	X	X	X	X	X	X	X	X		X	X	X
	Baharmand & Comes, 2019	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Guillot, 2018	X		X												X
	Dodgson & Genc, 2017	X	X	X				X	X	X	X			X	X	X
	PA Consulting, 2019	X	X	X	X											
	DH Network, 2016	X	X	X	X		X	X			X		X		X	
	Fuller, 2017	X	X	X					X							X
	ICHA, 2018	X	X						X						X	
	Babich & Hilary, 2018	X		X	X	X						X	X	X		
	Pinkert et al., 2019		X		X	X							X		X	
	Total	**12**	**9**	**11**	**7**	**4**	**4**	**5**	**5**	**3**	**5**	**3**	**4**	**4**	**6**	**7**
Blockchain for Commercial SCM	Marr, 2018	X		X				X								
	Project Provenance, 2015	X	X	X	X			X		X						
	Banerjee, 2018	X		X	X	X	X				X	X	X	X		
	Casino et al., 2019	X	X	X	X		X	X	X		X	X	X	X	X	
	Vorabutra, 2016	X		X	X			X								
	Kshetri, 2018	X		X	X							X	X	X	X	
	Wang et al., 2019	X		X	X	X		X	X			X	X	X	X	
	Biggs et al., 2018	X		X	X			X			X	X	X	X		
	Hackius & Petersen, 2017	X	X	X		X			X			X		X		
	Francisco & Swanson, 2018	X		X						X	X			X		
	Notani, 2018			X					X	X						
	Pai et al., 2018	X			X	X		X	X		X	X	X	X	X	
	Wust & Gervais, 2018	X	X			X	X		X	X	X			X	X	
	Total	**12**	**4**	**11**	**8**	**5**	**3**	**7**	**6**	**4**	**6**	**7**	**6**	**9**	**5**	

Table 1. Sources by benefits & challenges of using blockchain for HSCM

Literature cited: **1.** Munslow, B. & Brown, C., 1999. Complex emergencies: The institutional impasse. *Third World Quarterly*, 20(1), pp.207–222. **2.** OCHA, 2019. *Global Humanitarian Overview 2019*, Available at: https://www.unocha.org/sites /unocha/files/GHO2019.pdf. **3.** Zwitter, A. & Boisse-Despiaux, M., 2018. Blockchain for humanitarian action and development aid. *Journal of International Humanitarian Action*, 3(16).