Can Blockchain Solve the Puzzle of Labour Standards Implementation in International Trade?

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Abstract:

In this chapter, we discuss how blockchain technology can be used to monitor and implement labour rights in international trade. While research highlights the link between labour standards and trade, clear guidance on how to design, monitor and enforce such frameworks in trade agreements is lacking. Commitments undertaken through trade agreements primarily focus on countries adhering to basic workers' rights, rather than obligations regarding working conditions and pay and rest on crude checks and balances. The growing consumer demand for ethically sourced and produced goods requires increased traceability and transparency of labour rights. Currently information flows along the supply chain on labour rights are scarce and opaque. We argue that blockchain has the potential to limit unethical or fraudulent actors in that technology can revolutionise monitoring and compliance on labour issues under trade agreements. The transition from current form to blockchain enabled monitoring would, however require increased engagement and concerted efforts by both private and public stakeholders.

Keywords: International Trade; Labour Rights; Trade Agreements, Blockchain; Technology

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1. Introduction

Labour standards are defined as "*the rules and regulations that govern working conditions (working time, employment stability, workers' representation rights, minimum wages, health and safety in the workplace, etc*.)". These rules and regulations can be established through legislation, collective agreements or both. The link between the enforcement of labour standards by means of trade agreements continues to be controversial, both in academia and policy practitioners space, with no clear guidance on how to design appropriate labour standards frameworks in international trade agreements.

Studies examining labour standards suggest that there are arguments both in favour of and against the inclusion of social clauses in trade agreements. Some studies express concerns that low labour standards in countries may be 'unfair' to the extent that such clauses may distort international competition (Charnovitz, 1987; Walwei and Werner, 1993). Others argue that in the absence of international standards, the 'race to the bottom' is likely, risking trade leading to a deterioration of national working conditions. In this context, economists argue forcefully in support of minimum wages and employment protection legislation, as such commitments support the improvement of human capital and support higher real incomes for workers, which can be justified on the basis of long-term efficiency (Castro et al. 1992).

The issue of labour standards is an increasingly important feature of EU's trade policy, in particular with regards to the negotiation of free trade agreements (FTAs). As part of its trade policy, the EU has established a novel architecture of international labour standards governance under the Trade and Sustainable Development (TSD) chapters of its FTAs. Commitments under EU FTAs include substantive standards, procedural commitments and institutional mechanisms (Harrison et al., 2019).

Blockchain technology can be used to support the alignment of labour standards in trade agreements at both the national and firm level. Labour standards covered by a trade agreement, both bilateral and multilateral, focus mainly on countries adhering to workers' rights ~~basic human rights~~ rather than obligations that require partners' commitment to working conditions and pay. The case for inclusion of human rights is more forceful and the requirement to respect workers' right of free association echoes the view that this right is fundamental to human dignity. Once the obligations have been made, however the current ability to subsequently monitor and enforce labour rights ~~checks and balances~~ within bilateral commitments under an

FTA setting have remained unchanged and the inclusion of labour provisions thus be argued to have limited practical implications so far. Promoting labour standards—or at least appearing to do so—can be important for certain businesses, given the growing consumer demand for ethically produced and sourced goods. At micro level, blockchain ~~this~~ can enable firms to meet the level of consumers' scrutiny, and at the same time give firms the business ethics toolbox to empower labour.

The rationale to use blockchain for implementation and enforcement of labour standards is that there are actors willing to circumvent standards (e.g. not upholding labour standards, selling counterfeit goods or taking part in corrupt activities) because the risk of being caught is small, which gives them an incentive to cheat. When producers put supply chains on a blockchain, the opportunity for unethical or fraudulent actors is minimised as the technology offers a new layer of traceability, transparency and accountability. From the buyers' perspective (i.e. intermediate producers), blockchain can provide access to all information on labour standards at the literal push of a button and buyers can verify whether these have been adhered to by the producers. Customers are the other party that stand to benefit from blockchain as they can scan a QR barcode and instantly access information e.g. the date of harvest, location of cultivation, the owner of the plot, when it was packed, how it was transported, i.e. information that can be verified without the presence of a trusted third party or central institution (Kiviat, 2015).

2. Blockchain a 'silent revolution' in international trade?

Blockchain (in conjunction with other new technologies such as Internet of Things, IoT and Artificial Intelligence, AI) is inducing a third technological wave of inventions facilitating global trade by lowering the cost of information. The previous two waves were the introduction of the shipping container, which radically lowered the costs of transportation and the Information and Communications Technology (ICT) evolution, which lowered the cost of communication. Although tariff and non-tariff barriers to trade have been significantly reduced by policy, international trade continues to entail significantly higher costs, both with regards to finance and time than domestic trade. These include not only transport costs, which are determined by distance and commodity characteristics, but also at-the-border and behind-the-border costs. An often overlooked source of costs are those related to handling information pertaining to the traded goods, i.e. documents needed along the way, e.g. Trade Finance,

Customs Procedures and Provenance of goods (McDaniel and Norberg, 2019). By enabling technical advancement to the handling of data, blockchain technology stands facilitate trade by lowering the cost of information. Moreover, technological update enables higher traceability across global value chains (GVCs) in international trade, by providing the information needed to verify and scrutinise them, adding a layer of transparency with regards to labour standards (in this case) and ensuring the use of ethical labour for increasingly conscious consumers.

Demystifying Blockchain

Blockchain technology is a digital concept for storing data, developed to solve the issue of how two parties, without knowing or trusting each other, could conduct an online transaction without having to rely on a middle man to act as a trusted third-party intermediary (Gabinson, 2016). International trade- which is a long chain of transactions requiring trust, built on connecting actors that neither do not know or each other, nor have anyphysical interaction- is a good realm for the applying the technology.

The main idea behind the concept is to simultaneously *decentralize* and *secure trust* between parties looking to perform a transaction. It is a distributed digital ledger system which holds information about transaction having taken place in a register that is transparent, accessible and once the information has been entered, formed into an immutable "block", meaning it cannot be altered. This process continues as additional data is available and transactions completed and new blocks are added to the existing blocks, creating a chain.

A blockchain node can be any internet connected electronic device, such as a computer smartphone or tracking device for Global Positioning System (GPS) or temperature. The term *distributed* means that all data in the ledger is held by multiple actors and *consensus* means that data on the blockchain is deemed valid when confirmed by all actors to be so- by the use of software rules- rather than by third party authentication. All transactions of information are handled according to a *security protocol*, i.e. added through cryptography, ensuring that they are meddle-proof and once all nodes have reported that they have in fact handled all the information that was set up, to be handled chronologically as one "block" in the process. Once the block is closed, it is immutable, meaning it cannot be deleted or changed. A new block is then generated for the continuation of the process, keeping records of previous as well as the next part of the transactions in the ledger.

In addition to the nodes and the program, the digital system also contains actors. Actors are the entities that share information along the process. In examples of blockchains set up to accompany trade transactions, actors could be inspectors verifying labour conditions, or that the shipment has been inspected and adheres to regulations, the importer's bank setting up a letter of credit, the carrier issuing a bill of lading (receipt of cargo for shipment) or Internet of Thing (IoT) monitors (e.g. measuring temperature or humidity inside shipping containers transporting perishables), or GPS to coordinate and track movement, and so forth. Some actors have the authority to add information, while others are restricted to having only viewing privilege. The blockchain is set up so that all have access only to the part of the process that pertains to them (Norberg, 2019).

The blockchain concept stands in contrast to the present procedure, where in traditional data bases, the information is held by a central party and many transactions are carried out using middlemen keeping ledgers of transactions and acting as proxies for trust and information. The current set up of handling information is opaque, costly and inefficient, making the process slow, and excessively reliant on middlemen and paperwork to ensure that the information is correct and appropriate. Since the physical investments needed to add actors to an existing blockchain are small (access to a smart phone or computer is all that is needed), it offers a solution by both making the current process more efficient and transparent, but also by enabling more information to be made available regarding a certain product or process. In addition, the simplicity of the blockchain enables the storage of information that can be used as checks and balances for the information entered, such as empowering workers by making them identifiable actors on their own or having ILO representatives enter information regarding the adherence regulations to working conditions.

Within the context of adhering to labour standards, a case study on Peruvian mangoes offers an illustrative example of a situation where the current system relies on workers to clock in their attendance as evidence of the regulations regarding working hours is being followed. Research into the practical application of the system however, disclosed that this regulation was not sufficient in order to trace the correct information on the number of hours worked by any particular worker (who often were required to work more than the contracted hours, with workers only signing their paperwork in the beginning of their shifts and foremen forging their signatures at the end of the shift). As discussed, this is case where the incorporation of blockchain technology could be used as a solution by offering a way to empower workers and

improve transparency and accountability with regards to workers' work time and their rights in the supply chains of EU supermarkets (see Racz, and van der Wal, 2011).

3. Employing blockchain to foster ethical labour in international trade

The main argument in favour of using blockchain technology as a mean to improve labour conditions is to address opaqueness of work environments by the means of engaged consumers. Apart from the information supplied by sellers, consumers have few means of investigating the use of labour input in the goods purchased. While general information about national working conditions or specific for some firms may be brought to consumers' attention thru the networks of NGOs or whistle blowers, actual information about the labour conditions behind a specific product is rarely available to consumers when making the decision to purchase. Businesses are engaged in global chains of purchasing relationships (of agents, subcontractors and multiple suppliers) in the search for lower prices and production costs, which means that the origin of product is generally relevant at the lower end of the supply chain. This has since changed and with growing demand for detailed information on the supply chain components by external stakeholders (e.g. by intermediary producers/customers as they want information where the product comes from, or regulators who need to confirm the origin of product and production processes) means that transparency and accountability of the product supply chain is increasingly important.

The benefits of blockchain can be reaped by retailers who can effectively provide consumers with information on where the goods originate from, which would be a competitive advantage compared to those that do not, thereby effectively segmenting the market for consumers that demand goods produced with ethical labour versus those that do not consciously demand such an attribute. There are, however, implications for consumers, producers and markets. Consumers willingness-to-pay for goods is more for goods that can demonstrate production with ethical labour compared to goods that are unable to provide proof to this effect. Producers who can provide evidence and information on whether the goods have been produced using ethical labour standards would command a premium. This is due to growing consumers'

awareness and willingness to pay higher price for such goods compared to those produced using bonded labour.

A review of literature suggests that studies primarily focused on consumer willingness to pay within the context of organic, and environmentally friendly products (see McFadden and Huffman, 2017 for a review). These studies show that a large proportion of consumers are willing to pay a premium for organic and increasingly for environmentally friendly products, such as paper straws (for detailed discussion see Loureiro et al., 2001, Bernard and Bernard, 2009, Bougherara and Combris, 2009, Yue et al., 2009, Combris et al., 2011). Elliott and Freeman (2003: 9, 28) highlight the central role of activists in informing consumers about the role of standards and pressuring the world community to give a greater share of the benefits of trade to workers thereby creating a financial margin for increasing wages. There is, however, lack of unanimous agreement on whether, or not, labelling should combine different characteristics to increase consumers' willingness to pay. Given that there is an expanding consumer interest in ethical trade, an interesting economic question arises: under the assumption that there is incomplete information- how do individuals' willingness to purchase such products respond to industry information or both industry and independent, third-party information? Within the context of ethically sourced or produced goods, the provision of independent, third-party, verifiable information can have substantial effects on buyers' decisions (Rousu et al., 2007). These studies show that consumers' decisions are likely to be strongly influenced by the degree of competition among information suppliers, and the level of information available to the consumers.

Eliminating asymmetric information is likely to empower better-informed choices by consumers, reduce suboptimal consumption, and decrease the unintentional risks of consuming goods using unethical labour. While this may allow producers to command some degree of 'premium' for such labelled products, it would most likely affect welfare in the country producing the goods using unethical labour. The demand for goods produced with unethical labour is most directly correlated with consumers' unwillingness to pay for such goods. At the same time, an increase in the demand for goods produced using ethical labour is likely to be higher by consumers that are more conscious of the working conditions (Hamilton and Zilberman, 2006). The optimal methods for introducing higher quality information and improving access to such information is yet unknown, in part because the industry producing goods labelled as 'produced using ethical labour' is still in its infancy given it is difficult to list

information on working conditions and labour rights for the consumers. However, the transformation from 'labour opaque' supply chains to higher levels of transparency is not straightforward, particularly given that supply chains are increasingly complex with multiple manufacturers, processors and distributors in a 'glocal' economy. Any move to build in information on labour usage will thus require a collective engagement as well as industry level initiatives in order to drive critical adoption and deliver benefits to the supply chain participants and end consumers.

Thus, labelling products with verifiable information about ethical attributes of labour usage can be an avenue for firms looking for viable options, and allow such firms to profile themselves by putting information on blockchain about their efforts to source ethically produced goods to the consumers. The review of literature on socially responsible consumers (also called ethical consumers) suggest that the topic is complex and can be approached from a variety of perspectives based on both the issues (e.g. environment, animals or people) or consumers involved (e.g. ethical, green or fair trade) (Newholm and Shaw, 2007). In their (2007) paper, Low and Davenport point out the gap in research between ethical attitudes and actual ethical consumer behaviour (e.g. boycotts of unethical products or purchases of socially responsible products). Meanwhile, Tallontire et al. (2001) provide an overview on the methods, such as conjoint and contingent valuation, and suggest while these are helpful as exploratory tools, econometric methods using actual consumer behaviour would improve the estimation of willingness to pay for ethical products.

Efforts to develop a willingness-to-pay model for an attribute change have been discussed by van Ravenswaay and Wohl (1995) and Halbrendt et al. (1995). These efforts are based on the Lancaster model, where consumers are hypothesised to derive utility, not directly from the goods per se, but from attributes produced by those goods. Traditional theoretical literature focuses on the elasticity of the consumer, i.e. response to price change more than the willingness to pay for any other attribute of a good. Often, consumers' willingness to pay has been used as a tool in cost-benefit analysis though elasticity is a key variable (see Lee and Hatcher, 2005 for an exhaustive review of literature on consumer's willingness to pay for a particular attribute of a good or service).

In business terms, there are examples of growing advances to implement ethical attributes of labour usage through corporate social responsibility (CSR) initiatives. These initiatives include

voluntary labour initiatives by supermarkets as is the case with Costa-Rica - United Kingdom banana chain (Robinson et.al., 2010). Whilst these do not employ blockchain, the main aim of voluntary regulations within the realm of CSR is to regulate labour practices across national boundaries and protect labour rights in the workplace (Block et al., 2001). The labour initiatives in the banana chain draw on the International Labour Organisation (ILO) core conventions by focussing on labour standards (e.g. freedom of association, collective bargaining, non-discrimination, abolition of forced labour, elimination of child labour) and the ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy.

Such voluntary labour standards have been introduced either by collaboration between parties involved in international supply activities (companies, workers and their representatives) or as a response to the campaign activities of other interested parties, such as non-governmental organisations (NGOs), civil society groups and consumers (Hopkins, 2004). Voluntary initiatives are, however, no substitute for trade unions and effective national labour regulation enforcement. Here, blockchain can be used to record and execute such standards which can be incorporated on Smart Contracts[iii]. In such cases, commitments undertaken through trade agreements can be set up to verify products that meet the prerequisites for labour regulations and standards.

Is blockchain technology the solution to improving labour conditions?

As discussed, blockchain has the potential to make crucial information both more readily available and easier to verify, which enables a new layer of transparency and accountability to the global process of international trade. In so doing, the adoption of the technology is likely to increase productivity, speed, robustness and independence along the supply chains. Hence, blockchain certainly can be said to hold the possibility of evolving the process of international trade in its current form. However, the usefulness of the technology rests on the assumption that it is widely adopted, i.e. in order to reap the benefits the technology has to offer, blockchain needs to be interconnected across sectors, industries as well as international borders. Getting to that level of adoption will take time, willingness and careful consideration of the problem at hand as well as the engagement and cooperation of multiple stakeholders.

The process of wider blockchain adoption and integration in international trade is likely to take on a three-tiered approach. In the first tier, the technology is independently developed and utilised by single firm (possibly multinational) within a private, pre-existing ecosystem. This

is, to a large extent where blockchain technology adoption was operating in 2018-20. Within this first tier, firms experiment with the technology, building Proofs of Concepts (PoCs) and procedures. In addition, firms are working by trial and error to analyse what part of their operations can be improved by the use of the technology, and perhaps even more importantly, where it is not. American multinational retailer, Walmart, has been instrumental in conducting successful pilots that use blockchain to keep track of the specific origin and process (e.g. where it was grown and details on it was processed and transported) as well as verifying authenticity of agricultural products, crucial to tackling food borne illnesses for mangos in the Americas and Chinese pork (Kamath (2018).

The second tier of blockchain adoption has emerged as the technology is mature enough to be used in collaboration between and across different ecosystems. In this setting, the firm (actor) invites others that are not part of their ecosystem (such as independent subcontractors or suppliers) to join in the blockchain initiative. This part of the adoption process is about connecting the dots, developing interoperability both between existing initiatives, across industries and compatibility with regulations and standards. Here, the extent of technology adoption hinges on: (a) getting the blockchain to work across other actors' different parts of the ecosystem (value chains); and (b) having the incentives to make the investments, i.e. the investment decision will be driven by the demand from consumers and producers in seeing (and being willing to pay for) increased transparency. If implemented, this is opportunity for small and medium sized enterprises (SMEs) that are looking to compete on qualitative characteristics rather than just price. The reported success of the recent initiative by the French Supermarket chain Carrefour shows support of the uptake of blockchain. Their 2019, blockchain program included 20 items, within the dairy, meat and produce sectors, and incorporated information from adjacent actors in the supply chains, like farmers, transporters and veterinarians (e.g. reporting whether the animal had been given antibiotics) and slaughter house, IoT thermometer. By simply scanning a QR sticker on an item's packaging with a smart phone, customers were given instant access information regarding the provenance and process of the product as well as how it was transported to the store's location. The sales of the items on blockchain were shown to outperform the non-blockchain alternatives (Forde, 2019), supporting the notion that consumers prefer products with more available information.

The third and final tier, involves adopting blockchain on the national and international levels. This part of the process builds on national initiatives to make supply chains transparent, based

on government initiatives. This type of technological adoption hinges on a much wider adoption, based on broad public sector engagement and public investments in the technology in response to a general demand for increased information. In this setting, increased information will be more widely available and useable to the public, rather than just actors affiliated with a privately initiated blockchain. This tier will take the adoption from private to public sector leadership and investments, such as issues regarding the opacity in FTA labour chapters, and in this process providing a wider layer of transparency with regards to general production or production of smaller national actors, on issues such as adhering to labour rights. It is at this stage that the ILO rights *per se* can be monitored and enforced on a national level.

By enabling and democratising the process of information holding and handling in trade, blockchain can undoubtedly help facilitate international trade. The importance of trade facilitation is an issue that the trade community is already keenly aware of and are working to address, by initiatives such as the ongoing efforts to implement the WTO Trade Facilitation Agreement. More importantly, the introduction of blockchain stands to enable adding a new level of transparency to empower all actors in the trade chain; the workers, the smaller firms, the subcontractors, the firms downstream, and not least tip the scale of information asymmetries that the current system gives rise to, and empower consumers to make more informed choices. As the frailty and unproductiveness of the current system of information flows in international trade is uncovered, the process of adoption will be driven by self-propelled demand for accountability. Since the silent revolution of blockchain builds on something that buyers are not yet aware of, there is an implicit learning or awakening process that needs to emerge. As more information can be made available with emphasis on growing transparency, the current system of inherent information asymmetries will be made obvious and will further increase consumer demand for higher levels of transparency. As of now, buyers can only trust the seller that the displayed information is correct, and implicitly that that the paperwork regarding previous steps in the chain captured that all previous information was accurately and the process carried out according to protocol. Furthermore, information that may be of interest to consumers (e.g. where exactly did it grow, when was it picked? by whom? What age were those who picked it and what were they paid? how was it transported? what-if any-chemicals used in production?) has been lost along the way.

No chain is stronger than its weakest link- and this holds true for GVCs. In the current set up, trust is crucial for the operation of GVCs. Sellers rely on the trust of consumers, producers rely

on the trust of intermediate suppliers, and so forth. The way the chain of information and command is set up, there are vulnerabilities built into the system, which are not considered until the chain breaks. In such cases, firms' reputations can be destroyed by a mistake that is not theirs, (such as the 2013 fraudulent scandal in the EU where Romanian horsemeat had been disguised as beef and used as input in frozen foods (Carnegy, 2019)), or punished by association. Consumers also risk getting cheated. In addition, the system may not be able to prevent circumventing international trade rules (as was case for Chinese steel being circumvented thru Vietnam to avoid the US tariffs imposed under section 232 of the Trade Expansion Act of 1962).

In the beginning pundits argued that (much like the problem of standardising cell phone bands like the GSM vs CDMA), interoperability between different blockchains would be a major obstacle to wide adoption of the technology. Since then developers have worked successfully on solutions to that problem. The recent IBM Initiative *Thank My Farmer*, where diverse actors across the entire coffee supply chain are connected using a standardised blockchain which clearly demonstrates the willingness and possibility of circumventing that problem. In the initiative, which also serves as an illustrative example of the traceability made possible by blockchain, consumers can use their smartphones to scan a QR code on the side of a coffee jar and follow the production chain from their purchase all the way back to the grower, with a built-in option to make additional payments to that particular farmer (Baker, 2020).

4. Conclusion and way forward

Blockchain has the potential to eliminate middlemen and add a new layer of traceability, transparency and accountability to the global process of international trade. In addition, blockchain can be used to facilitate trade and democratise the process of information holding/handling, which can truly revolutionise international trade. However, providing an added layer of traceability and transparency may induce extra costs. Assuming that consumers are willing to pay (alternatively producers are willing to make the investment to avoid risking their reputation) for ethically produced goods, compared to the price of a conventional goods with similar characteristics, suggests that there is a new market segment, something similar to the 'Fair Trade' market. In this manner, with the introduction of blockchain technology the consumers' search for ethically sourced and produced goods could be facilitated, given that the

initial investments are relatively small, and all the consumer would need for verification is a smart phone or a computer, once the blockchain is set up the producers/suppliers at firm or national level.

Reaping the benefits of blockchain crucially hinges on the adoption of the technology to gather and hold information related to issues such as working conditions. While blockchain offers a technical solution, there are nevertheless hurdles to the wider adoption of the technology and reaching the full potential will take time. The relatively slow adoption of blockchain cannot be attributed to either financial investments nor technical difficulties, but rather to inadequate communication and cooperation between stakeholders, most notably so between the private and public sector. As the biggest potential client. as well as the rule maker, the public sector could benefit by taking a more proactive approach and getting involved with other stakeholders.

A possible venue would be to for the public sector to encourage public-private partnerships to create incentives for the uptake of blockchain for monitoring and implementation of labour standards through trade agreements. The rationale for this suggestion is that the potential impact is big for increasing transparency and accountability but this will require the will of consumers, businesses and policy makers to push for the use of blockchain as a key to unlocking its potential to revolutionise trade in products using ethically sourced and labour.

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[iii] A smart contract is protocol that does not require human interaction or middlemen to track and verify the process along the way. The contract itself is set up with an if/then algorithm for the criteria that needs to be met in order for an execution of the next phase. Hence, the current phase of the production in itself is evidence of the criteria for all prior phase being upheld. The contract can be set up so that the whole process is transparent and trackable, making it a prerequisite for subcontractors to fulfil not only the parts of the delivery per se, but that it has the necessary paperwork and inspections etc that need to be met and displayed before executing the contract. For trade related purposes, a smart contract can be set up to verify for example that a product meets prerequisites for regulations and standards, like environmentally friendly, sustainable, adhering to labour standards, rules of origins etc.