



Blockchain for Global Health

Revolutionizing supply chain management and health financing through a decentralized database and peer-to-peer networks

WHY BLOCKCHAIN?

Blockchain is one of the most talked-about technological innovations today. In the Financial Services industry, many companies using blockchain have seen increased security, reduced costs, decreased transaction time, and increased transparency all while eliminating the need for a third party intermediary. A blockchain-based financing system reduces fraud and corruption risk in global health development while accelerating necessary transactions through secure and immutable ledgers. Further, blockchain technology is elastic and may play a role in reducing vaccine wastage by allowing traceability of products at any given point in a supply chain.

At its most basic, blockchain is a vast, global distributed ledger or database running on millions of devices and open to anyone, where not just information but anything of value – money, titles, deeds, music, art, scientific discoveries, intellectual property, and even votes – can be moved and stored securely and privately.

Four major issues that may arise in the implementation of blockchain are yet to be overcome. These are: data privacy and governance, complex regulatory environment, resistance from incumbents. Furthermore, lower and middle-income countries (LMIC) may not have the infrastructure needed for adopting a blockchain technology. Most corruptions in LMICs stem from the leadership level, and no transformation can succeed unless it is built on political commitment to support the process of change.

Disruptive potential

The disruptive potential of blockchain represents a significant paradigm shift towards financial equity through universal access to financing. By removing the need for third party intermediaries, blockchain unlocks a new world of cost and time savings, namely:

- **Eliminating bank fees and transaction costs** charged by intermediary financial institutions;
- **Avoiding long processing delays and transaction backlogs** that often result from reliance on third parties; and
- **Creating data that is more readily available, reliable and auditable** through decentralized storage.

Since transactional information is available to everyone on the network, data can be readily verified by all parties. Blockchain is able to promote global financial equity by allowing those who previously did not have access to financial instruments — the poor and those living in corrupt or unstable environments — to evade the bureaucratic hurdles of financial institutions.

Figure 1:
How blockchains change the way we transact

Traditional transaction model

- Multi-tiered Transaction relying on central authority
- Transaction data primarily stored by the central authority



Blockchain transaction model

- Transactions are carried out directly between providers and their customers
- All transactions data is stored on a distributed blockchain with all relevant information being stored identically on the computers of all participants
- Ideally, all transactions are made on the basis of smart contracts: **SC** i.e. based on predefined individuals rules concerning quality, price, quantity etc.
- Largely automated, decentralized transaction model with no need for third-party intermediaries



Blockchain financial transfers to 10,000 Syrian refugees are estimated to save the World Food Program \$150,000 a month while eliminating 98% of bank-related fees

One popular blockchain technology called Smart Contracts can revolutionize traditional development aid from the World Bank, United States Agency for International Development (USAID), the Department for International Development (DoD), and NORAD. In blockchain transactions, conditions must be satisfied before a transaction can be executed. Once verified, if any piece of the data in the transaction is changed (for instance the transaction amount) then the system will return an error. This makes data highly secure and reliable. The real-time exchange and verification of information makes auditing (and consequently regulatory reporting for donor agencies) simpler.

Finally, smart contracts allow for seamless tracking of ownership among transacting parties. Take, for example, the shipment of vaccines internationally. When blockchain technology is applied to this health supply chain, important data such as the quantity and quality of the transported vaccines can be verified before, after and during the shipment. Further, blockchain enables the automatic funds transfer once all parties are in agreement.

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APPLICATION POTENTIAL IN SUPPLY CHAIN

The disruptive potential of blockchain described above can be applied in the global health context across the immunization supply chain and logistics.

Blockchain allows all stakeholders — from distributors to health workers — to record and monitor the movement of vaccines along a supply chain and ensure the availability of sufficient levels of working vaccines.

Tracing the route of vaccines from the manufacturer to health facility to child not only significantly increases vaccine safety, it also reduces wastage and allows for better monitoring of vaccine stock and supply chain performance.

Combined with Internet-of-Things devices, a blockchain-powered supply chain also enables temperature monitoring of vaccines moving along the supply chain. Thus, this would improve vaccine availability and help identify ways to increase efficiency and reduce costs.

APPLICATION POTENTIAL IN HEALTH FINANCING

The disruptive use of blockchain creates a new dimension in global health financing, attractive to private investors and family foundations that previously shied away from investments in lower- and middle-income countries. Blockchain increases efficiency, reduces costs, allows simple scale-up if needed, and generates verifiable and auditable data in real time. While many see innovative financing instruments such as social impact bonds and development impact bonds as a viable health financing solution, scaling these instruments with investors has proved challenging due to time gaps in return on investment and the difficulty of measuring impact. Blockchain provides a platform to address these challenges and enables automation of outcome-based financing.

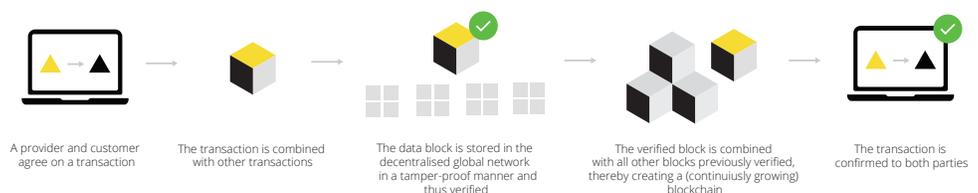
Blockchain paves new paths for transnational healthcare capital markets, decentralized venture capital projects, microfinance, and microinsurance in LMICs.

As global trends move towards creating centralized identification systems, blockchain-based systems also provide an opportunity to create smart contracts, direct funding, and mitigate fraud.

APPLICATION POTENTIAL IN HEALTHCARE DATA

The disruptive potential of blockchain creates an opportunity for open and transparent health data networks, which in turn will allow LMICs to capitalize on national health data for research and innovation, creating a more equitable global market for health data. Further, blockchain can expand countries' access to new methods of monitoring and evaluation of data in real time. No matter what the context, there's a strong possibility that blockchain will affect the global development community. The very big question is when.

Figure 2: The blockchain process



LOOKING AHEAD

While many global health applications are still in a pilot stage, the disruptive potential of a decentralized transaction and supply system coupled with automation from smart contracts is becoming apparent to international development leaders.

Like any other disruptive technology, it will take participation and pioneering by major players to drive the momentum. As such, global development and technology leaders will need to continue researching and piloting blockchain technologies and their application in global health to experience the extensive cost savings and efficiencies blockchain offers.

This system of tracking is especially useful when ensuring efficient use of financial resources and enabling fast-tracked, transparent, output-based financial transactions. What's more, smart contracts can help reduce vaccine wastage along the supply chain.

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