Leveraging Blockchain Technology for *Halal* Supply Chains

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Background

Halal supply chains are vulnerable due to their credence quality attributes, importance of maintaining *halal* integrity throughout the supply chain, need to avoid doubt, lack of control of food norms, and sensitivity of the Muslim consumer towards *halal*. These vulnerabilities make *halal* supply chains complex to design, manage, and optimise. Transparency of *halal* supply chains is needed in order to ensure trust and authenticity of a *halal* brand. The principle of a shared database that is safe, open and verifiable without a central operator is an attractive proposition to embed trust and authenticity for *halal* food, cosmetics, home care, and pharmaceuticals.

Blockchain is the main technology behind Bitcoin. Blockchain is already called the Fourth Industrial Revolution. It is a digital public ledger comprising stringed data blocks containing information, similar to our DNA. It is not stored somewhere centrally, but distributed on many servers throughout the world. Blockchains are encrypted and automatically synchronised in the distributed blockchains, making them a trusted public ledger that everyone can inspect, but no single user controls.

The combination of the distributed ledger technology with smart contracts, contracts between supply chain partners that ensure *halal* compliance in each link in the *halal* supply chain, has the potential to create high performance *halal* supply chain networks.

What are the Challenges Facing Current *Halal* Supply Chains?

A large discussion on *halal* blockchains was held on 15 May 2017 at Universiti Malaysia Pahang in Kuantan (Malaysia) organised by the Faculty of Industrial Management. This large discussion group showed that *halal* supply chains have inherent problems or flaws, namely in: (1) traceability (ability to verify the location of a product) and organising product recalls; (2) transportation and warehousing (storage) downstream of the supply chain in accordance with *halal* requirements; (3) end-to-end chain integrity (unbroken chain) from source to

point of consumer purchase; (4) different *halal* systems and interpretations of different markets; and (5) lack of integration of information technology systems.

These problems require a radically different approach to how *halal* supply chains are orchestrated. *Halal* blockchains have the potential to solve all of the above *halal* industry problems!

A Vision of *Halal* Supply Chains Through Blockchain Technology

A *halal* blockchain would be a digital ledger of all *halal* supply chain transactions that have ever been executed. It would constantly grow as ‘completed’ blocks are added to it with each new set of transactions. The blocks are added to the blockchain in a linear, chronological order. Each node in the *halal* supply chain network gets a copy of the blockchain, which gets downloaded automatically upon joining the *halal* supply chain network. The *halal* blockchain has complete information about the addresses and their supply chain path right from source to the point of consumer purchase. As the *halal* blockchain database is shared by all nodes participating in a *halal* supply chain network, information is easily verified by just scanning the QR-code (a two dimensional barcode) on a product.

Blockchains pre-program the *halal* requirement of the destination market, such as: *halal* production certificate requirements, *halal* storage-transportation-terminal handling terms, coding of *halal* on freight documents, and many more. In a blockchain you can easily identify the parties that committed fraud, as this remains visible. This discourages the industry to commit fraud in *halal* supply chains. At the same time it allows the rating of *halal* logistics service providers, distributors, and other supply chain participants based on the performance of their services.

***Halal* Blockchain Design Principles**

The main objectives to be achieved with *halal* blockchains are: reliable data and trust in *halal* supply chains; seamless and efficient *halal* process from source to point of consumer purchase; sustainability of *halal* supply chains; consumer confidence in *halal* brands; and global recognition of *halal* blockchains.

The main principles of *halal* blockchains are: that *halal* blockchains incorporate the different *Mazhabs* of the destination market, in particular the Islamic schools of thought, *fatwas* (religious rulings), and local customs; *halal* blockchains should be relevant for both Muslim and non-Muslim countries; *halal* certification requirements of the destination market and mutual recognition be critical design principles for *halal* blockchains; supply chain participants be automatically aligned and informed on process compliance based on the specific product-market scenario; and authenticity and security of *halal* blockchains be

a top priority to protect confidential information and minimise the chance and impact of cyber attacks.

Smart contracts are pre-agreed autonomous programs that define supply chain relationships as well as automatic actions. In the case of *halal* issues, the blockchain system would trigger automatic immediate action based on the smart contract's terms, for example, initiating a product recall, internal and external communication, informing of *halal* authorities, etc. Automatic action reduces lead-times in resolving *halal* issues, thereby reducing reputation damage.

Performance measurement of *halal* supply chains and their participants is critical to ensure high performance. This requires first of all a classification of *halal* blockchain participants in terms of a *halal* assurance system; local and international *halal* certification; and whether a *halal* assurance system is in place or not. Second, the actual *halal* performance needs to be measured in areas of efficiency, effectiveness, and robustness.

Manufacturers, brand owners, and retailers benefit from *halal* blockchains, in particular through transparency of supply chain, synergy advantages through vertical and horizontal collaboration, standardisation of *halal* assets, and more effective risk and reputation management. Logistics service providers and distributors benefit from *halal* blockchains too, in particular through long term customer relations, better use of *halal* assets, consolidation of *halal* cargo and new value added logistics and services, digitalisation of paper flows, and more efficient payment settlement. *Halal* certification bodies benefit through easy auditing of *halal* supply chains and faster support for industries in case of a *halal* issue or crisis.

Conclusion and Recommendations

Halal blockchains provide clear advantages for manufacturers, brand owners, retailers, logistics service providers, distributors, and *halal* certification bodies. For better trust and authenticity, a country's *halal* brands and *halal* certification bodies should embrace this new technology to support the *halal* industry in case of a *halal* issue, or worse, a *halal* crisis. They should support the *halal* certification of logistics service providers, distributors and retailers in order to facilitate a higher compliance in transportation and warehousing downstream of the supply chain. Harmonisation and standardisation of *halal* supply chain standards in different jurisdictions will be essential in the coming years to better support *halal* industries and their global supply chains.

Notes

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