Trust by design: The disruptive role of blockchain in the agrifood sector

Blockchain has become such a buzzword that is easy to lose track of the relatively simple concepts that underpin this revolution in the management of any transaction and the dramatic improvements it offers all players in the agrifood sector.

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In this document we will summarise the blockchain revolution and explain how PwC serves as a key integrator between the technologies involved, the business requirements and the experiences of end-users. As we work together on blockchain solutions, the goal is to improve your competitive advantage via transparent and safe food supply chains. In a genuine win-win scenario, blockchain-induced product integrity enhances the efficiency of both your business and those with whom you do business with.

The agrifood sector is entering an era of 'trust by design'. A paradigm shift is taking place from using audits/reviews to check that the rules of the game have been followed to blockchain systems which are designed to create real-time trust among players.

In essence, you could compare a blockchain to a logbook of transactions that is shared among a network of interested entities and updated simultaneously. Unlike such a logbook, however, any change to the blockchain requires approval from all who are part of the network. It is the fact that information is shared which provides the security that the transactions recorded are accurate. The result is an immutable decentralised database of transactions which, in the case of a permissioned blockchain, is distributed between a limited group of people. It makes visually clear what is happening within certain parts or all of your food supply chain – from products to participants and their activities, the choice of what to share forms part of the rules of the blockchain.

The essence of a blockchain

- All participants are linked together in a network
- Each chain member validates that a transaction is correct
- Any failure to validate brings (potential) fraud to light
- The order of transactions is confirmed by participants
- All data on a transaction is secured in uniquely labelled blocks
- All members have the same copy of the blockchain

Going beyond fraud

The agrifood industry makes headlines for the wrong reasons. Just as the furore about 'horsemeat burgers' fades, we read about tainted meals being served at well-known outlets in the UK, how Dutch farmers are creating virtual calves to avoid milk quotas and other scandals which make tabloid headlines.

As harmful as such episodes are in terms of public image, the benefits of blockchain-based systems go far beyond their ability to stop such fraud in the meat sector. Across the entire spectrum of the agrifood industry, from crop quality to land registration, from animal welfare to food safety and social compliance, blockchain offers traceability, risk reduction, accountability, audibility, sustainability, performance improvements and all-round business efficiency for all participants in a given chain. This means in the future we will be able to trace beef back to its original farm in real time. We will also be able to receive confirmation that animal welfare conditions are continuously met or even know whether or not antibiotics have been used in the products we consume. Of course, this is only possible if a community agrees to share this information in an interconnected agrifood community supported by blockchain technology. This doesn't mean everybody can see everything. The power of blockchain is that it can create an

ecosystem in which information is shared on a relevance basis. If consumers want to know the origin of food, the community can agree on sharing this information.

Secure exchange

The blockchain concept rests upon different parties in the supply chain being able to securely exchange valuable information. To use the example of the protein business, this data might include unique animal identification, with DNA, births, weight gain, feed conversion, stable performance and veterinary events.

Industry surveys show an increasing demand to know exactly where products are coming from and how safe they actually are. Agrifood is a globalised business with long supply chains and multiple players who don't always know each other perfectly. The involvement of developing markets increases complexity due to a lack of formal structures there and a propensity for short-term informal sourcing agreements rather than long-term established relationships.

Best of both worlds

Transparency and trust go both ways. Retailers want to know they'll receive what they pay for while those at the start of the chain like to be sure that people did in fact receive what was created on their behalf. Blockchain offers tremendous opportunities for optimising the supply chain. Understanding the results of certain activities in the chain – analysing, for instance, the effectiveness of a feed conversion not just from selected samples but from all animals in the chain – lets you adapt accordingly. The information secured in a blockchain of custody can be used to decide which animal producers you do business with. And so on...

At PwC we are convinced that the blockchain concept can add considerable value, significantly increasing efficiency while also improving animal welfare and food safety standards in the process.

All well and good... But we are also critically aware that being convinced of a concept's validity is only the start of a journey. Most blockchains are private and permission-based so who decides who can join the community? Where does the legal buck stop? Who defines the rules of engagement? Which technology is most applicable and who are the potential solution providers? And even if there is a solution available, how do you customise this to your specific situation and client requirements?



The role of PwC

Taking on the role of integrator, PwC oversees and alleviates complexity for its clients. We organise blockchain solutions, bring people together, and drive things forward as agreements are made on what will be exchanged and how. A successful blockchain relies as much on ensuring that the right people come together in the right spirit as it does on the technology involved. In this respect, the experts at PwC create business benefits, deliver the appropriate technical solutions to support those benefits, and serve as an interface between the two. We have already done this for the protein business where we have set up an initial protocol for information exchange between partners in the supply chain. This protocol defines, for instance, the basis on which new-borns are transferred into digital

assets that start the blockchain, and what data is captured on the blockchain during growth, slaughter and further down the supply chain. All with a clear business case on what is the value of sharing for each party in the chain.

We distinguish ourselves through what we call <u>BXT</u>, combining our knowledge of what is happening in a given Business (in this case agrifood) with the eXperience of end users and an understanding of the relevant Technology and the best ways to apply it. Many players only look to technology, others focus solely on the business side, and certain agencies leverage on experience without having in-depth knowledge of the technology and business. PwC solutions are more effective because we understand all three of these vital aspects and the links between them. We can therefore offer you:

- The capacity and ability to set up networks and make them as efficient as possible
- Knowledge of which challenges need to be overcome to create the new form of organisation required for blockchain solutions to work
- Support with implementation and the change processes for each party in the chain
- Assurance that everyone in the network will adhere to the rules.

Case studies

The arc-net transparency platform is an example of one of PwC's partnerships that result in a working blockchain technology for use in the food sector. While there is no shortage of start-ups who can program the interfaces related to blockchain solutions, arc-net delivers a proven solution that has been shown to work in the industry in practice. It is an excellent example of how the challenge of linking digital and physical assets can be solved in the agrifood sector: the critical move from concept to reality achieved via a mixed dataset of DNA and GPS tracking within the blockchain. Parties have invested in this technology because they can grasp real benefits. The transparency offered by blockchain does not only promote food safety and reduce the risk of food fraud significantly,





there are also clear benefits to be gained from higher predictability and data analytics that remove inefficiencies from the supply chain.

We are also working on a smart solution for a major food trader that places all legal documents on the blockchain in a way that ensures that everyone involved, from the African suppliers to the end receivers, can access this information. The inclusion of customs and import clearance processes, which involve multiple parties and transactions, builds in an additional layer of security and allows for more efficient crossborder trade in an area where time is indeed money.

Ownership of land is one of the greatest sources of conflict in the world today. A blockchain solution for land trade registry in West African countries has major potential. We are also exploring how to use blockchain within emerging markets as a trading solution for physical agricultural commodities that reduces intermediation and currency conversion costs, lowering the barriers to entry for smaller players.

Major protein producers currently use external parties and farmers to raise animals on their behalf, most of whom operate outside direct business control. Farms may be very efficient in ensuring that chicks, for instance, become somany kilos of meat – but there can be significant differences in end results even when the same preconditions are in place. A blockchain solution that properly tracks that information and provides feedback is not only of value to the producers but, crucially, the farmers themselves.

This latter example showcases again how blockchains offer benefits for all parties involved, taking a very different approach from standard supply chain overview solutions enforced by one party upon another. A blockchain helps create a level playing field and a win-win solution for all who are involved. Now that is something worth exploring...

Your next step?

You don't have to invest heavily in sourcing indepth knowledge of how blockchain works in order to grasp the clear opportunities it offers. Contact the integrators at PwC and let us be your guide.

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