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The opportunities of blockchain technology for crop insurance in Kenya

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Key Messages

- **Blockchain technology could improve crop insurance processes**
- **Application of blockchain technology could boost crop insurance uptake in Kenya**
- **Blockchain based crop insurance may create more transparent and inclusive forms of insurance**
- **Kenya offers optimal enabling factors for innovative fintech solutions**

Kenyan climate risks and crop insurance

Although the role of agriculture is becoming smaller with regards to the Kenyan economy, it is still providing livelihood to more than 80 percent of the Kenyan population (FAO, 2018). Most farmers in Kenya are semi-commercial farmers combining subsistence farming with commercial farming. Climate change is posing grave risks to agricultural activity in Kenya. Current projections suggest temperatures will rise up to 2.5ºC between 2000 and 2050 and rainfall will become more intense and less predictable (Netherlands' Ministry of Foreign Affairs, 2018). The slightest increase in frequency of drought will already present major challenges for food security and water availability (Netherlands' Ministry of Foreign Affairs, 2018).

Insurance of crops can help farmers in hedging against possible negative externalities of climate change such increased droughts, an increasing number of floods, or hail. However, insurance procedures can be tedious to the point where farmers who are enrolled, might not collect their insurance at all. Insurances are not always accessible or affordable, and the process of insurance pay-out is not always transparent so that trust issues can play a role. Currently, 3% of the farmers have access to formal insurance. At the side of the insurer the costs of processing large numbers of small farms and the increasing frequency of climate related crop failure inhibit its commercial success.

Interviews point out crop insurance is currently not taken up by insurers in Kenya because they do not have insight into the history and status of a farmer, they find it difficult to determine the insured amount, the transaction and administration costs are high, the number of claims are too high, lastly they feel famers may be susceptible to become exposed to inputs from unreliable suppliers. Insurance companies that offer crop insurance to farmers find it challenging as farmers themselves may feel insurance is too expensive, it is not a tangible product for them, they do not trust insurance or insurers, some farmers may not feel it is relevant for them, and they require more knowledge on what insurance is and how it works (Bolt, 2019).

As blockchain technology is a distributed technology, it may offer some advantages for some of the current challenges in (micro) crop insurance, for example in Kenya.

Blockchain technology

Blockchain technology is a decentralised governance system that could transform current structures for citizenship, authority and democracy (Atzori, 2015). It enables transactions without the need for intermediary parties such as banks or notaries. This could mean it is interesting to employ blockchain in situations where transactions are being hampered by distrust or improper governance. The technology is in fact a database technology and is regularly acknowledged for its impact on reducing transaction costs, creating better provenance and improving on traceability and transparency (Baker & Steiner, 2015). Blockchain may provide promising opportunities for disruption such as provision of legal clarity and decreasing the need for trust and financial exposure in already existing agreements, it may enhance uptime and overall security, reduce costs of running services and the organisation's reputational risk, and improve transparency and auditability by granting instant access for executives, clients and regulators at any time (Deloitte,2016).

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Smart contracts

The first utility of blockchain offers true immutability of recorded data, enabling transactions to be settled without the need Trusted Third Parties (TTP's) such as banks or notaries. It is also 'unstoppable'; the systems works as a network of nodes, a peer to peer system (comparable to the internet); there is not central party that could be coerced. The characteristic of immutability can be compared to a kids game of playing with plastic cup phones. Two cups connected by only a string where the message of person A is directly transferred to person B without intermediaries or possibility of tampering of information while the design of the system (two cups and a thread) is publicly known, tested and validated.

Hereafter, a second utility was added; using the immutable and unstoppable features for the execution of programmed business logic called 'smart contracts'. Software execution can be publicly validated on immutability which provides certainty on what has transpired. A smart contract is an automated self-executing agreement between parties (Swan, 2015). Through smart contracts it is possible to create requirements, where it is impossible to unilaterally conduct the transaction without meeting set requirements. The immutability of data and logic, processed using smart-contracts, provides upfront-compliance for transactions. Normally an auditor, notary or accountant would provide this certainty afterwards. A smart contract is executed through a process of four steps (Hans et al., 2017);

1. Contractual agreements are translated to code;
2. Information supply is then provided by a Trusted Third Party,
3. The receipt of information triggers execution of the contract to validate whether predefined conditions are met;
4. If the conditions are met, the transaction process is automatically set in motion per the terms and conditions of the contract.

An example could be the execution of a will; the agreement is that when a person passes away, their funds will be released to a specific NGO. Information is for example provided by the municipality on the fact that the person is deceased, the contract is set in motion, and the funds are transferred to said NGO as per the agreement. If the NGO does no longer exist, or if the person is still alive, the conditions of the contract are not met and no transaction is executed

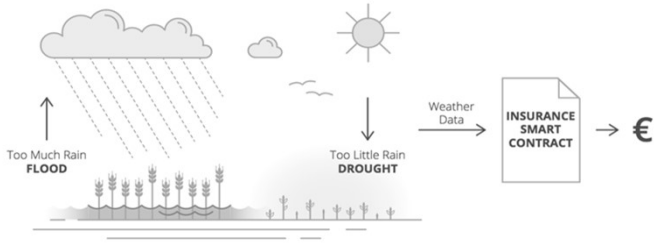

Figure 1: Parametric Insurance (From Etherisc, 2017)

In parametric insurance (Figure 1), the agreement exists between the insurer and the insured under specific threshold conditions (e.g. consecutive days without rain), information is added by a TTP in the form of data concerning the conditions (e.g. weather data) after which a pay-out is automatically triggered. As the contract is automatically executed without a central party, the insurance company or insured party cannot intervene to stop the payment or change the conditions. This provides for a more transparent process for both parties. Furthermore, provided that the information is reliable and well calibrated, there is no need for the insurer to undertake extensive pay out processes, saving both costs and time benefitting both parties.

Example

A collaboration by Oxfam, Sanasa, Aon, and Etherisc has started to implement a crop insurance product to Sri Lankan smallholder in the form of a blockchain based parametric insurance, triggered when extreme weather events have scientifically verifiable impact on crops. This platform uses blockchain to minimize costs and provide farmers with better opportunity for access to insurance. The consortium targets 10,000 farmers in 2020.

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Kenya and fintech

Kenya is an interesting country for a blockchain based crop insurance pilot. According to a local regulator: "Kenya has always embraced innovations. Adaptation and adoption towards innovation is something Kenya as a country is willing to support also from a regulator and government perspective. A blockchain based innovation could help with issues of trust (specifically the turnaround time). But we must also consider the requirements, protection of consumer data and value." Kenya has a high uptake of mobile payments and has good infrastructure for development of apps and digital solutions, for example offered through an API by Safaricom. The Kenyan government has set up a designated Distributed Ledger Technology and AI taskforce that is advising and providing recommendations on the use of blockchain technology in Kenya, for example in agriculture, health, and land titling. They have also advised creation of a fintech legal and regulatory sandbox, which has been implemented.

The regulatory sandbox is a framework allowing fintech start-ups to conduct their innovative solutions in a controlled environment and under a regulators supervision. Such sandboxes are a way to balance innovation and risk in favor of financial inclusion (GPFI, 2017). The sandbox could for example allow for start-ups to develop and implement an insurance product without the need for an insurance company, whereas outside of the sandbox this right is solely reserved for (certified) insurance companies.

Blockchain based crop insurance in Kenya

For this study we consulted with ACRE Africa (an intermediary for index insurance in Sub Saharan Africa) and Etherisc (a tech start up for blockchain based insurance products) for the design of the solution. They have created a design for a blockchain based crop insurance in Kenya (Figure 2). From the perspective of a smart contract, the insurance company and farmer will enter into an agreement where the service provider and weather data provider will act as Trusted Third Parties providing information on the triggers for executing the contract. These triggers may value per district, but also per commodity. Variations are possible where a contract may be set up between a farmer and other willing financier. This process is transparent for all parties involved where no party can individually alter the agreement. This would allow for more inclusive types of micro insurance systems.

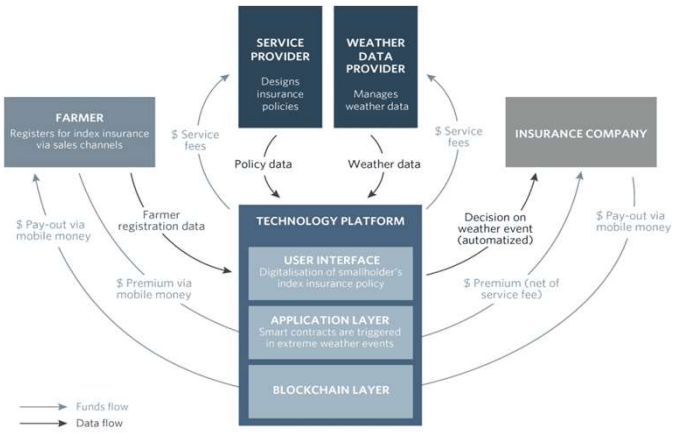

Figure 2:) Crop insurance through a smart contract in Kenya (From Climate Finance Lab, 2019)

Kenyan farmers and blockchain based crop insurance

Insurance is a longstanding industry and it is not always in the best interest for insurers to conduct a payout to insured customers. This is reflected in the decrease of the number of payouts to a minimum. The field study shows that Kenyan farmers distrust insurers and insurance in general, for example because of the payout conditions. In a decentralized platform, the payout conditions would be transparent and immutable based on the set conditions in the smart contract. This could disrupt the insurance industry and create open risk pools accessible to any investor willing to bear financial risks for farmers. It could eliminate current existing intermediary links within the purchase of insurance and could democratize access of insurance.

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Risks and challenges

Although Kenya may overall provide a desirable environment for fintech solutions, offering such products to Kenyan smallholder farmers is not straightforward. The WEF (2018) described some risks and challenges for using blockchain technology such as the adoption of the technology, technology barriers, security risks, legal and regulatory challenges, interoperability risks, and the energy consumption challenge. In Kenya we recognise some of the same challenges. The field study shows that Kenyans may favour the application of blockchain technology, describing it as blockchain or mentioning crypto, is detrimental for the uptake of the solution. A large group of farmers interviewed for this study were not yet aware of what insurance is and how it works, so providing information and training tailored to the local context (and language) is essential. In fact, communication, education and engagement are the most important factors of offering a blockchain based insurance to small holder farmers.

This Info note summarizes the study on the potential use of blockchain technology for crop insurance in Kenya. This study is undertaken for the project 'Incentives and innovative finance for scaling Climate Smart Agriculture (CSA) up and out' which is part of the flagship 'Climate-Smart Technologies and Practices'. This study is a follow up from a 2018 study on the financial resilience of smallholder farmers in Kenya affected by climate change

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Further reading:

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