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CariCrop: Can a digital payment system support fairer agricultural trade?

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Abstract: What difference can new technologies make for small-scale farmers facing a multitude of uncertainties that could affect not only the value of their crops but also when and whether they get paid? To understand how Distributed Ledger Technologies such as Blockchains, could be leveraged to address such uncertainties in agricultural trade, we engaged small-scale farmers in a problem delineation exercise, and designed CariCrop, a payment system and currency that specifically addresses the issue of delayed payments. We investigated the potential impact of this system through immersive drama and deliberative workshops. We found that although digital payment systems can give farmers greater autonomy in agricultural trade, these systems do need to be designed with careful consideration of social values and integrate local economic and legal infrastructures.

Keywords: digital payment; blockchain; design for social change; agriculture; deliberation

1. Introduction

Small-scale regional farming is key to guaranteeing regional food security. Large scale, single crop farming often focuses on exports and can lead to dependency on imports, leaving the internal market vulnerable to commodity price fluctuation.¹ This applies to the Caribbean, where small-scale, multi-crop farming has been incentivised as part of a food security policy defined by CARICOM (Caribbean Community Market) and endorsed by the Food and Agriculture Organization (FAO) of the United Nations.² Yet many small-scale farmers face uncertainties that affect not only their financial stability, but also the very practice of multi-crop farming. According to the FAO, agriculture provides “key income opportunities” and involves “a

¹ Which was particularly the case during the financial crisis of 2007-2008 when commodity prices rose sharply and left those who depended on food imports extremely vulnerable.

² The food security policy is an attempt to re-balance a historical tendency through which large-scale export monocultures were politically and economically favoured, to the detriment of small-scale polyculture production (Lewis, 1954), leaving a legacy of food insecurity in the region.



large share of the working poor” (FAO, 2018, p. 6). In this paper, we examine the potential of a new digital payment system and currency (CariCrop), powered by distributed ledger technologies (DLTs), to increase financial stability in multi-crop farming practices, by addressing small-scale farmers’ payment uncertainties in Jamaica. Here, Jamaica serves as a case study, among other territories in the Caribbean facing similar challenges that have also been studied as part of a broader research (Pschetz et al., 2020). We report on how different stakeholders perceived CariCrop’s design and how it responded to the requirements and expectations of Jamaican small-scale farmers and key stakeholders in the agriculture value chain. These insights are then translated into design considerations.

2. Supporting agriculture in Jamaica

In Jamaica, there have been many initiatives to address agricultural marketing and exchange challenges (Ministry of Industry, Commerce, Agriculture & Fisheries, 2017; Planning Institute of Jamaica, 2010; Shik et al., 2017). Examples include setting up an Agri-Business Information System (ABIS)³ to provide advice for small-scale farmers on how to improve production and market their produce (including advice on what to grow and how to price their produce) (ABIS, 2019). ABIS creates a digital platform that offers a direct link between farmers and final consumers through the Agri-linkages Exchange (ALEX) (RADA, 2018), therefore removing intermediaries and allows farmers to set higher prices. Other efforts were aimed at addressing payment issues (Agriculture Task Force, 2009) through for example establishment of a clearing house to pay farmers on time, provided that farmers supplied to approved hotels at a discount, and that the hotels agreed to be charged an interest rate on delayed payments (Gleaner, 2014). The clearing house addresses an issue that was identified as one of the key concerns by our participants. As we will explain in the following sections, CariCrop leverages DLTs, such as Blockchains, to address payment delays without burdening farmers to offer discounts or hotels to pay interests for late payment.

Finally, Blockchain technologies have been explored in Jamaica to provide alternative credit scoring for farmers through Farm Credibly (2019). Farm Credibly uses immutable Blockchain records to build profiles of farmers for investors and lenders who are looking to support agricultural projects. In contrast, and as we will explain, CariCrop does not process information about farmers or their transactions for the purpose of financial credibility profiling. Instead, CariCrop uses Blockchain to trace the original source of money from customers (e.g. a hotel) to final recipients (e.g. farmers or farm suppliers), creating a profile of trustworthy customers who originate chains of payment.

3. Methodology

To engage small-scale farmers in technology design development, we embarked on a two-step process of ‘conceptual investigation’ and ‘empirical investigation’ (Friedman & Hendry, 2019). The aim was to elicit people’s values, preferences, and expectations of their

³ See <http://mail.abisjamaica.com.jm/home/index.php>.

relationships with their immediate circle of stakeholders and the technologies that mediate these relationships.

3.1 Phase 1: Conceptual investigation

This investigation featured: (1) stakeholder interviews; (2) focus groups with small-scale farmers; and (3) design and development of a prototype that allowed participants to interact with the concept (based on the problems identified in the experience-sharing focus groups) and its embodied DLT potential. We carried out interviews with 22 agricultural stakeholders from commercial, insurance and government sectors. We organised two focus groups – in the north-east (NE) and south-west (SW) of the country – to understand farmers' relationships with other stakeholders and the problems therein. There was an average of eight small-scale, multi-crop farmers in each focus group. We explored farmers' stakeholder network, the attributes that farmers ascribed to (and tensions in) these relationships. We then conceptualised and developed a prototype (see Section 4), which were used to prompt discussion in Phase 2, our *empirical investigation*. The usage of our prototype followed the example of previous attempts to use unfinished digital services to invite discussions on their particular issues (Nissen et al, 2018).

3.2 Phase 2: Prototype testing in deliberative workshops

We then engaged in an empirical investigation through prototype testing and elicitation of people's requirements and expectations of CariCrop as a technological solution to uncertainties in price setting and payment, with two groups of farmers in the same locations (NE and SW) and one group of agricultural stakeholders (in Kingston). There were seven farmers who had participated in the experience-sharing focus group in Phase 1 in the NE workshop. Due to last-minute dropouts there were two farmers in the SW workshop. The stakeholder workshop in Kingston had 13 participants, most of whom had joined the stakeholder interviews in Phase 1. Workshops with the farmers were held in their local communities to facilitate greater interaction and observation of CariCrop in its intended context of use. Farmers and other stakeholders participated in separate groups to ensure equal and open discussion relevant to the core interests of each group.

We designed the workshop based on the work of Pschetz et al. (2019) and Coleman et al. (2018), also drawing on:

- Immersive drama (Bryant, 2007; Bryant & Darwin, 2003): (a) connecting the farmers' personal experience with other stakeholders' experiences and perspectives, particularly those in the farmers' immediate circles such as buyers and farm suppliers, and (b) drawing out emotional and rational responses from the research participants.
- Deliberation, which, according to Dryzek (2009) and Mansbridge et al. (2012), is a talk-based process to derive mutually acceptable solutions to human problems through an open, reflective and respectful exchange.

The speculative prototype featured CariCrop as a mobile phone application that acted as a bridge currency, mediating the relationship between farmers and other stakeholders - while providing a socio-technical context to aspects of the farmers' agricultural activities. Following the practice of immersive drama (Bryant & Darwin, 2003), the research participants were asked to choose and play either the role of a farmer, a buyer or a farm supplier. The participants who volunteered in this role-play were then asked to interact with one another, using the app, in an illustrative scenario to mimic the problematic aspects of the farmers' agricultural cycle: (1) selling the agricultural produce and (2) the onward purchase of supplies to grow new crops (see Section 4.2).

In each scenario, the moderator played an important role in introducing problems that participants reported in Phase 1 and probing participants in their respective roles as well as those who were observing the interactions to resolve the problems using the prototype. The moderator engaged participants in a deliberative exercise to work through their experience and collectively develop mutually acceptable solutions. All focus groups, workshops and interviews were audio-recorded and transcribed. Thematic analysis was used to identify the farmers' values, priorities and preferences. This analysis provided insights into farmers' desired agricultural experience and the roles of technology in realising that.

4. Phase I: Problem definition and prototype development

4.1 Problem definition

From the stakeholder interviews and our initial experience-sharing focus groups, we derived a common network of stakeholders across both research sites (NE and SW), comprising:

- Family members, fellow farmers and support workers;
- Independent intermediaries of various scales – the small ones are locally called 'higglers';
- 'Big' or wholesale buyers (e.g. supermarkets and hotels);
- Irrigation and water suppliers;
- Input suppliers;
- Government stakeholders

Our analysis of the experience-sharing focus groups recording revealed that many farmers followed their intuition and their perception of high-value crops based on price surges rather than official advice (e.g. through ABIS or agricultural officers) or other forms of records: *"Most farmers don't do research ... they're not even thinking about what it's going to be when they finished this crop. Some people don't even document how much they spend"* (farmer, SW).

The farmers did not see their decision-making process on crop selection as problematic, which suggests that it would be useful to reflect on the relationship between farmers' habits

and intended benefits of official initiatives. However, farmers in both groups reported that they were most frustrated about their transactional experiences. They indicated that most of their transactions were made at the farm gate, mainly with ‘higglers’, as intermediaries are locally called, and in some cases with wholesalers, such as hotels and supermarkets. In these transactions, buyers often set the price. Payment time and models varied. In many cases, farmers were not immediately paid when goods exchanged hands. Farmers in both groups reported having little to no negotiating power over price or payment in exchange for their produce: *“Everybody in this room very rarely gets a fair price”* (farmer, NE).

Uncertainties around price setting and payment were described as problematic because such arrangements disrupted the cash flow required for farmers’ preparation for their next crops, which also affected farmers’ trust in the buyers. They could not always translate these value judgements into action due to a reported lack of choice (of alternative buyers) and resulting low sense of agency related to price setting and payment.

Asked how they coped with cash flow disruption, some farmers reported relying on advances of goods from local farm suppliers, based on informal oral agreements. Farmers in both groups steered clear of taking loans from financial institutions due to uncertainties about their ability to pay back the loan plus interest or insurance fees and the shared knowledge of other farmers’ struggles with credit enforcement: *“Sometimes I trust from the farm store. If you don’t have none left in your pocket, you can go back to them and credit again.”* (farmer, SW).

Asked to rank their problems, farmers in both research sites put ‘return on investment’ uncertainties at the top of their list. Our analysis of the interviews and focus group data further suggests a deep-rooted power asymmetry and a knock-on effect of these uncertainties on farmers’ trust in the buyers and other agricultural stakeholders’ trust in farmers and their financial credits. To further investigate the potential of technology in levelling this power asymmetry and human trust in economic exchanges, we developed a speculative prototype called CariCrop, a form of bridge currency, to explore the promises of DLTs, particularly concerning trustworthy exchanges (Elsden et al., 2018) without the requirement “to trust anyone in particular” (Werbach, 2018, p. 9).

4.2 Prototype development

The CariCrop prototype drew on DLTs’ ability to record a chain of immutable transactions and the potential to facilitate secure, accurate and transparent transactions and to automate payments based on predefined conditions (smart contracts) (Pschetz et al., 2020). It took the form of a digital payment system with a bridge currency manifested through ‘promise pots’ that can be used by buyers (typically hotels) to pay farmers (mostly small scale) immediately on the purchase of agricultural goods. The app bridges time lags of actual payments while reducing the burden of delayed payments for farmers – who, by using the CariCrop’s bridge currency to buy goods, can distribute payment responsibilities across relevant stakeholders.

Farmers can use full ‘promise pots’ (digital currency), or fractions of them, to purchase resources, such as food and farm supplies. Records of all transactions are securely stored in the Blockchain. Once the original payment is made, it is automatically distributed to all stakeholders by a predefined algorithm (smart contract). In other words, the payment is guaranteed by the transaction’s record and by a smart contract stored in the Blockchain. This way, the original buyer, instead of owing payment to a single farmer, now starts to owe payment to a chain of stakeholders, who might be in a better position to wait for the actual funds to be transferred. At the same time, the bridge currency offers farm suppliers and other stakeholders payment assurance through transparent, immutable and trackable records of the funds and the automated payment, enabled through smart contracts, which guarantee distribution of money to all contractual parties on record.

In an illustrative scenario, a farmer (‘William’) and a buyer (‘Caribbean Dream Hotel’) arrange the sale and delivery of 20kg of bananas for US\$2,000. They use their phones to record the exchange of bananas for the bridge currency. A record of where the money comes from and where it will be passed on to is then made as a ‘promise pot’ on the blockchain. William then wants to buy US\$800 worth of fertiliser. He hasn’t yet received payment for the bananas, but can offer the bridge currency for the fertiliser. If he has several ‘promise pots’, the farm supplier can choose the ‘pot’ they deem more trustworthy.

When Caribbean Dream Hotel is ready, the payment is released, triggering a smart contract chain to automatically pay all the vendors, including William, and then deduct from William’s payment to pay the farm supplier, leaving William with US\$1,200. With time, sellers and buyers build a profile of trust. Buyers’ ‘promise pots’ become more trustworthy and sought after as they keep their promises. Farmers can keep a record of all transactions, helping to monitor the history of crops and plan for the future. Shops and other stakeholders can increase trading activities with greater payment certainty. In this way, this currency could support a more dynamic economy and potentially promote greater development and redistribution of wealth – as indeed suggested by literature on complementary and community currencies (Michael & Hudon, 2015).

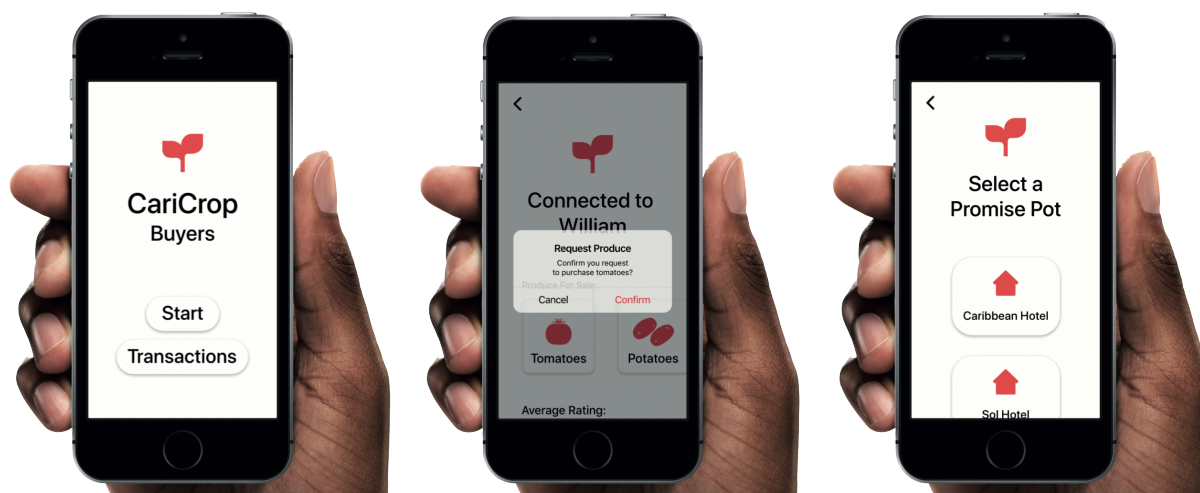


Figure 1. CariCrop interface

5. Findings Phase 2: towards a fairer agricultural trade

In testing the prototype, we devised an illustrative scenario to help participants to co-create their experience within the social contexts of use in which farmers reported a return-on-investment uncertainties and the cascading trust issues in transactions (see Section 4.2). The scenario featured the farmers' intended transactions with buyers and farm suppliers, and transactional disputes, including delayed delivery of the agreed payment and agricultural produce. In addition, they were probed to identify what they found problematic about the experience and possible solutions throughout these scenarios.

The transaction started with the buyer raising a purchase request for 20kg of bananas with William, the farmer. Having received the request, William set the asking price and assessed the rating profile of the buyer before submitting the request. William and the buyer agreed on their transaction. The system recorded the transaction and sent both parties a receipt.

5.1 Purchase, payment and delivery

At this point of assessment, the participant who played the role of William and the other participants were asked about their thought process in deciding on the price and whether to engage with a particular buyer. In response to this question, participants across all three groups quickly gravitated to payment delivery:

“Seeing the goods come off of the scale, seems I need my money.” (farmer, SW)

“Sometimes, [...] further down during the business process, the payment starts delaying. I prefer [payment] on time and in [cash].” (stakeholders, Kingston)

They also reflected on the relationship between quantity and forms of payment:

A: “I was going to say to you that the 10 pounds of tomatoes, you wouldn't want to sell that on two months credit.”

B: "The wholesale is going to need a large quantity and a regular supply ... it needs 10 farmers to produce or ... you'd have to have ... Farmers' Association. ... That's how the Blockchain would work properly." (farmers, NE)

Their responses highlight the complexity of the reality of the trade of perishable goods in various dimensions. First, payment time emerged as the key determinant of trust in transactions across all three groups. This revealed the value of a punctual payment or immediate cash, implying that immediate cash gives farmers confidence or builds trust in the transaction. Consistent records of punctual payment build trust in the buyer, and play a part in the farmers' risk-calculation when deciding whether to carry out a transaction that does not result in immediate cash. Second, farmers associated credit sales with selling large amounts of produce, which they observed only a group of farmers or farmer associations could cater to. Importantly, they still associated CariCrop with the existing credit systems.

Farmers in both groups also reported their struggle in coming up with an asking price, as well as ad-hoc sources of information: "*selling some tomatoes ... you ... just call at the Coronation Market and find out the wholesale price ... they are normally the cheapest market in the country ... It could be more expensive, but it wouldn't go below that price ...*" (farmer, NE).

In contrast to the struggle reported by the farmers, stakeholders participating in the Kingston workshop did not find price setting complicated:

A: "Normally, it's what we call cost of production. [...] When they minus the input from the output, they come up with the price ... the lowest price they'll be able to sell. ..."

B: "Yes, based on the market. ..."

5.2 Onward purchasing chain: Farmers and farm suppliers

Having completed the transaction with the Caribbean Dream Hotel, the participant who was playing the role of William took the bridge currency to buy fertiliser from a farm supply shop. At this stage, the farmer initiated the transaction. The shop owner then received the request from the farmer and information about the 'promise pot' as well as the buyers who issued them. They could access details related to the 'promise pot', including the number of transactions recorded in the past and the average payment time of the particular buyer (issuers of the bridge currency). This scenario invoked the participants' perceived uncertainty and risks for farmers and farm suppliers, prompting discussions about credit and trust, based on their reflections on their experience of interacting with farm stores.

Responding to the scenario, both groups of farmers shared similar views that CariCrop's transactional records and automated payment could improve their negotiation power and lead to more trust. However, despite their aversion to engagement with banks reported in Phase 1, they still saw banks as guarantors of payments, and had difficulty imagining how the bridge currency would operate on its own, thus indicating barriers to acceptance of a perceived radical financial service.

A: "This is where ... the financial institutions have to intertwine with this app. Now, the farm store can say, 'This is my finance institute that accepts my payment.'"

B: "It might be more seamless if both the buyer and the farm store use the same bank." (farmers, SW)

A: "If ... the farm store is going to work with this app; it's going to be ... the major farm stores ... some of these small places are in the same cash flow difficulties that the farmers find themselves in."

B: "When you set it like this, it may give the supplier more confidence in the farmer. ..."

A: "... if there is an emergency ... the bank would know that your income is coming through at regular intervals every two months. ... Then the bank should be able to afford you a loan. ..." (farmers, NE)

Stakeholders participating in the Kingston workshop considered the power dynamics among the buyers, farmers and farm suppliers and the consequences of buyers (who issued the 'promise pots') not honouring their payments and countermeasures. Like the SW farmers, these stakeholders also preferred flexibility in forms of payment:

A: "The rating is a part of it. But how do I get paid? ... At what point is that converted to money?"

B: "I'm still concerned about the buyer's influence in the process. ... When you're taking a big institution out of it, and you are now putting a smaller person, a farmer, to negotiate or to force payment, I think now you leave a lot more people at ransom. ... As a farm store ... I'm looking at a trust credit line to verify ... there's nothing to help to push the buyer to make the payment." (stakeholders, Kingston)

In the excerpt above, farmers were assumed to be responsible for enforcing payment (as they currently are) rather than the stakeholders who now own the promise pot. The value of translating the 'promise pot' into fiat currency emerging from all three workshops is articulated in either the ways for farmers and farm suppliers to be paid in exchange for their produce or cash flow. All participants referred to banks or financial institutions as 'facilitators' for this 'cashless transaction' and as 'guarantors' for access to and the real monetary value of the 'promise pots'. While farmers reported avoiding taking credit from financial institutions, they still perceived them as authoritative figures with a matching power to guarantee the credibility of buyers who issued the 'promise pots', and even to enforce payment. Other participating stakeholders did likewise. This implies that, currently, trust is placed less in the transaction parties than in a third party entrusted to guarantee the transaction. Such assumptions could potentially be challenged with a system like CariCrop, but trust in the system would depend on its acceptability and therefore ability to sustain a functioning system of exchange for farmers and other stakeholders.

Crucially, the risk of the buyer defaulting also featured in the quote above. Indeed, if the buyer was still seen as trustworthy (e.g. a well-regarded chain of hotels), promises of payment made by this buyer would still be accepted by farmers and others. Such a chain of buyers' default or buyers becoming insolvent could grind all transactions in the system to a halt.

5.3 Dispute resolution

Such scepticism fed into the transactional disputes, resulting from delayed payment or product delivery. The participants were then asked how such situations would affect various stakeholders in this chain of transactions and how they would settle potential disputes. In response, participants across all workshops naturally considered penalties, compensation and preventative measures:

A: "Concern about my debt because I know the farm store will be calling me to ask me what is happening. ..."

B: "Where is the level of enforcement?"

A: "Would there be a penalty? Say ... 10% interest for late fees?"

C: "In reality, it could be us buying sweet potatoes from our local farmers. ..."

A: "There is a notification to say that payment will be one hour later. ..."

B: "Purchasers will be required to make a deposit. ... If [farmers] are delayed in delivery, then [payment] should be pending until delivery is made." (farmers, NE)

Some NE farmers were worried that they would be held responsible by farm suppliers, mirroring farmers' scepticism about the app's ability to address the underlying power asymmetry between farmers and buyers. They therefore proposed penalty fees to discourage late payment as well as compensation for damage from buyers' late payments.

However, their peers noted that there were various types of buyers, and that some of them may not be able to afford to pay the penalties. The participants then proposed a more empathetic enforcement measure of notification, a real-time update, or a trouble-shooting function in case of late payment to update the farmers about the delay and new payment date. These proposals highlight the value of flexibility and empathy for those who may not be able to afford the penalties. Others suggested using a deposit system to reassure farmers that parts of their costs would be covered. NE farmers were also committed to fairness and equal responsibility, suggesting that farmers themselves should be penalised for late delivery by having their 'promise pot' suspended until they delivered the agreed produce. SW farmers shared a similar concern about payment enforcement but proposed a different mechanism for enforcing payment based on reputational costs and trust.

Other stakeholders suggested a rating system based on records of transactions and activities in the supply chain to enforce payment, backed by validation from a trusted third party. Some proposed insurance as an alternative to manage risks associated with the bridge currency. Others proposed diverse payment options and timelines to accommodate varying levels of risk.

These scenarios also prompted the participants to think of disputes concerning quality control, verification of physical products and data integrity that are known challenges in digital transactions:

A: "Let's say ... when the delivery comes, delivery does not suit your expectation. ... [I ordered] straight bananas, I'm going to get curved bananas. ..."

E: “But if I’m going to supply tomatoes ... you take your photograph, and you upload ... the package stock before it leaves you, and you send it to them. They can then take a photograph and then upload it. ...” (farmers, NE)

Although farmers were willing to accept shared risks and responsibilities, they still focused on traditional enforcement mechanisms which have not been particularly effective in their past experiences. The proposed mechanisms for holding stakeholders in the supply chain accountable highlighted the complexity of structured power asymmetry as observed by a participant in the Kingston stakeholder workshop: “technology itself can’t really resolve [such a power asymmetry]”.

6. Discussion

The use of the CariCrop prototype to support the enactment of lifelike social context of agricultural transactions and deliberation helped participants co-create and negotiate an acceptable experience of future technology-mediated agricultural trade, with empathy for other stakeholders’ priorities. The deliberative exercise provided a platform for participants to work through their experiences and articulate their values, preferences and expectations of the solutions to the problems they identified in the focus groups. However, the experience was still largely influenced by habitual prevalent ways of carrying out transactions, and ideas of what it means to delay a de-facto payment in their current scenarios. Although participants generally agreed that CariCrop could help resolve some of the issues they faced, they still had some difficulty imagining how this would take place in reality.

These insights show that a blockchain-based bridge currency can address parts of the return-on-investment uncertainties and cascading trust issues, coinciding with the work of Kumara-thunga et al. (2020). However, for such technology intervention to be effective, it needs strong social and potentially legal backing, which, according to the participants, translates into the following design considerations:

Price setting: The root of small-scale farmers’ struggle with price setting rests not only on information about the going rate for the products they wish to sell, but also in their perception of their negotiation power. Farmers suggested that a potential integration of ad-hoc ways to set prices (e.g. the base-price offered at a particular market), and the option of a price range in relation to the quality, quantity and location of farmers and respective buyers would offer contextual information to evaluate how much negotiation power they have to drive their bargain.

Trusted third parties: Our findings indicate the potential need for regulatory mechanisms to transactions, and potential opportunities for official institutions to play a role as guarantor and/or enforcer in a cashless agri-exchange system. Here, trusted third parties are valuable because the accuracy and data integrity promised by the immutable records of Blockchain and the record-automated payment of smart contracts can yield procedural trust. Indeed, the system alone would not have the means to enforce the contract or payment if the payment conditions were not met. Additionally, although the system could sustain itself without

effective payments as long as the original buyer is considered trustworthy, a track record of defaulted payments would put the system at risk. Even a single large, defaulted payment could strongly affect the system if the original become insolvent.

Record-based trust: The analysis of participants' deliberation demonstrates a strong connection between trusted agricultural trade and accountability. This indicates the potential of technologies that provide real-time and accurate record keeping of transactions, record-based credibility rating of buyers and record-actuated payment, as well as expectations for technology to serve as a socio-technical infrastructure that supports the rebalancing of power relations in the agriculture value chain.

Flexibility: Participants' responses indicate how much they value flexibility, which translates into technology features that facilitate multiple sales options, which is particularly interesting given the ways in which farmers associated particular volumes with potential modes of payments, price comparison, negotiation, and delivery of goods.

Accountability and equal responsibilities: The analysis of participants' deliberation around disputed transactions indicates awareness that technical and socio-legal mechanisms should hold all contractual parties in the agricultural exchanges accountable to agreed types, quality, quantity of produce, payment and delivery time.

7. Conclusion

Farmers found asymmetric power relations between themselves and other stakeholders, particularly buyers, the most problematic. This inhibits their sense of agency and their actual ability to negotiate prices and hold buyers and other stakeholders accountable for the agreed payment for their produce, generating uncertainties for their return-on-investment.

Through a combination of speculative design, drama and deliberation, we demonstrate that a digital payment system powered by a Blockchain and smart contract has the potential to address small-scale farmers' return on investment uncertainties if it has sufficient socio-legal backing. For this technology solution to realise its potential, existing social, economic and legal infrastructures must be considered. In doing so, a careful consideration of how technology users in various roles interact with these infrastructures, and with one another, is required.

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