An Enhanced Real Estate Transaction Process Based on Blockchain Technology

Emergent Research Forum Paper

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Abstract
We discuss the current state of the Canadian real estate market and the impact blockchain technology could have on it. We start with a review of the current popular and scholarly literary landscape relating to blockchain technology and its real estate applications. Special focus is given to the impact the technology could have on transaction costs, transaction times and fraud deterrence in this market. Preliminary recommendations are provided in the form of blockchain based bidding and transaction systems.

Keywords: Blockchain, real estate, shared ledger, transaction process, bidding process, fraud.

Introduction
Over the past few years, the Canadian Real Estate market has been growing significantly as a proportion of total Canadian GDP (Argitis 2016). In major Canadian housing markets like Toronto and Vancouver increasing prices are beginning to make housing affordability a major concern (Kelly, et al. 2017). Transaction costs in Canada can range from between 11-22% of the total purchase price (Global Property Guide 2016). This data implies that improvements in transaction costs could have a significant effect on housing affordability for Canadian citizens.

Numerous reports indicate that fraud is a serious problem in the Canadian real estate market. The closed-bidding system currently used makes it hard to prove wrongdoing by brokers acting fraudulently (Malik and Foxcroft 2016). Other types of real estate fraud also occur in Canada, with title fraud being the most devastating to the victims financially (Myrick 2013). At present, little information exists on the total savings that could come from revamping the existing system. This research project intends to examine if changing the business process which currently records property transactions to one based on blockchain technology would significantly reduce the transactions costs, transaction times, and reduce fraud in the Canadian market. The project will attempt to identify the benefits, the likely costs of implementation, and give recommendations with potential alternative options.

This paper will address the challenges within the existing system and recommend an innovative business process using emerging blockchain technology. The literature review that informs the recommendations was conducted by systematically reviewing the available popular and scholarly literature on blockchain and the Canadian real estate market. The recommended process will be designed to increase efficiency, transparency, and fraud resistance. At present this paper is focused primarily on the Canadian real estate market. However, the techniques and solutions used here can be expanded or adopted to other alike markets. This paper is currently a work in-progress but will later be expanded to cover all the questions introduced here and examine the impact on international markets.

Blockchain Technology
Blockchain is a distributed ledger technology, the design of which was first released publicly in 2008 (Iansiti and Lakhani 2017). A blockchain ledger is a record of transactions that is shared across a network of users and individually verified by each participant (Swan 2015). Transactions are grouped together and tied to all previous transactions using a cryptographic technique called hashing (Swan 2015). Blocks of transactions linked together in this way make altering the record nearly impossible (Swan 2015). The difficulty is further
Blockchain first became famous for its use as the primary technology enabling the Bitcoin cryptocurrency, launched in 2009 (Swan 2015). Blockchain technology has continued to be developed for use in numerous different applications and industries. The technology has the potential to disrupt existing markets because it has solved a fundamental problem with creating a digital economy: How do you prove ownership of an asset in an environment where everything can be copied or modified? With this problem solved, the internet can be used as the foundation to build out a large-scale transaction processing platform.

Many global financial institutions have been investing in blockchain technology in recent years. The blockchain start-up R3 leads a technology partnership of over 75 financial institutions with the mission to research applications of blockchain technology on banking and finance (R3 2017). The partnership includes some of the world’s largest banks such as JP Morgan, Bank of America, HSBC, and RBC (Williams-Grut 2015). The investment into the technology is likely due to predicted improvements available from implementations of blockchain technology in financial transactions like reduced transaction times, lower transaction costs, and decreased risk (Deloitte 2017).

The functionality of blockchain has been expanded to enable secured, decentralized contracts and the ability to track real-world asset ownership (Bheemaiah 2015). Smart contracts are digital agreements that can be enforced automatically without the use of 3rd parties or manual intervention (Morrison 2016). Blockchain enabled smart contracts can help simplify complex transactions by removing requirements for escrow, physical signatures, lawyers and manual remittance (Morrison 2016). Ownership of physical and digital assets can be tracked using the blockchain framework. By using a method called “colored coins”, an asset is assigned a unit on a blockchain, and whoever owns that specific digital unit is the owner of the underlying asset (Mizrahi 2015). This can be applied to different types of physical ownership like cars, art, or real estate property (Mizrahi 2015). Later in this paper we present a blockchain model for real estate transactions to allow for this type of digital ownership tracking of Canadian property.

Blockchain for Real Estate

Real estate is a uniquely good target for blockchain technology because it has a complex transaction process that is built to prevent fraudulent behavior and enable strict ownership protection. These traits required by the real estate market are where blockchain is uniquely strong. Blockchain can be enabled to improve the transparency a system enabling regulators to catch and prevent fraudulent behavior. The architecture of blockchain also enables the creation of an immutable record which can be trusted to not be modified or lost, something which is not possible with traditional electronic or paper records.

In Canada, transaction costs for real estate can include title search fees, land transfer taxes, appraisal costs, legal fees, agent fees, listing fees, estoppel certificate fees, and notary fees (Ratehub 2017). While a blockchain system may not be able to eliminate all transaction costs, it could likely simplify the process in most jurisdictions. For example, a blockchain system with all previous transaction information could simplify the title search process to reduce the need for title insurance (Speilman 2015). Already, some jurisdictions are beginning to implement blockchain based title tracking systems including Georgia, Honduras and Ghana (Dale 2016). A blockchain system is also attractive because it could reduce the total transaction time to complete a sale. The real estate industry has historically been slow to adopt new technologies and so in many areas, real estate transactions are competed primarily through paper-based processes (Kelly, et al. 2017). Digitizing and automating the processes with smart contracts could significantly reduce waiting times (Swan 2015).

In Canada, real estate fraud can come in many forms. Per the Globe and Mail, title fraud usually occurs when a criminal pretends to be the legitimate owner of a property, takes out credit against it, then flees with the funds (Myrick 2013). A criminal may also sell a property they do not own, though this is a rarer form of title fraud. These forms of real estate fraud are likely the most damaging for property owners (Myrick 2013). A recent investigation by CBC Marketplace revealed that another form of fraud perpetrated by real estate brokers may be more common. This type of fraud can occur when a broker represents both buyers and sellers of a property. Brokers can withhold bid information from sellers to earn a second commission from buyers they represent, which fraudulently lowers the price the seller receives. (Malik and Foxcroft 2016).
Blockchain systems could likely be designed to help reduce both these types of frauds by providing greater transparency to title ownership records and the bidding process.

**Preliminary Recommendations**

The expected contribution to the existing body of knowledge is a more complete understanding of the impact the technology will have on the real estate market with clear recommendations for decision makers in each jurisdiction studied. The primary research question we want to answer is, “Does it make sense for governments to invest in a blockchain based real estate processes?” While the research described in this paper is still ongoing, it is evident now that the Canadian real estate market could benefit from blockchain technology. The final research paper will attempt to quantify the financial benefits and estimate the return on investment for each jurisdiction. Here, we introduce our preliminary recommendations which include an outline for two blockchain systems designed to improve the bidding and transaction processes. For each of the proposed systems, a diagram is included to help visualize the process flows.

**A Transparent Bidding Process Based on Blockchain Technology**

The current bidding process is primarily paper-based and controlled by the agent representing the property seller. In the current system, bids are submitted by the buyers’ agents to the seller’s agent who compiles them and communicates the offers to the seller. Counter-offers are similarly communicated through the agents to the buyers. In Canada, agents are legally allowed to represent both buyers and sellers in a single real estate transaction (Malik and Foxcroft 2016). This practice enables the “double-ending” fraud discussed earlier. Real estate agents can give confidential information about the existing bids to buyers they represent to allow that buyer to win by a small margin and effectively double the agent’s commission at the expense of the seller and potential buyers who are represented by their agents and are willing to pay more. While this practice is illegal, in the current system this type of fraud is very difficult to police and likely quite common (Malik and Foxcroft 2016).

**Transparent Bidding Blockchain (TBB) Process**

A blockchain based system can help to improve the control of information in the bidding process. A system like one outlined in Figure 1, named the Transparent Bidding Blockchain (TBB) process, would allow for the bidding information to be collected independent from the Seller’s Agent by means of securely capturing the bids on a blockchain. Select bidding information could then be withheld from the Seller’s Agent until bidding is closed, but still communicated to the Seller in real time, decreasing the potential for fraud.

A TBB system could improve the bidding process from the perspective of Buyers as well. The Seller could opt to allow Buyers to view selected information following their bid. A Buyer could perhaps view the winning bid amount and be given the option to submit a second offer. Buyers could check on the status of their bid through the TBB without needing to speak with the Seller Agent as they do now. This increases the systems communication efficiency.

A TBB system could also enable conditional bids that execute automatically within the bidding and transaction processes. This could take the form of time-sensitive offers which automatically expire, or a bid conditional on a successful inspection of the property. The accepted bid’s conditions could be loaded into the transaction blockchain, like the one discussed below, and be used as the basis for a smart contract.
An Enhanced Real Estate Transaction Process Based on Blockchain Technology

The current real estate transaction process contains many steps and participants. This is due to the high value of the transactions which necessitates intermediaries to be involved to establish trust and to confirm things like financing and title ownership are in good standing. Some of the steps involved in the typical real estate transaction include: securing financing, property appraisal, purchasing title insurance, hiring a lawyer, transferring funds, and creating the purchase contract. The manual transmission of data between the participants for all these steps makes the process take a long time. In addition, while the participants are waiting for each step to be completed, the only way they can know about the status and progress is by asking for an update by those executing the individual tasks.

**Smart Property Ledger (SPL)**

Deploying the concept of “colored coins”, we propose the Smart Property Ledger (SPL) system outlined in Figure 2. This potential replacement for the current system is built upon a blockchain ledger with smart contract functionality. Throughout the transaction process, conditions of the smart contracts are met, like financing approval, approved by the users and passed to the next user. A blockchain system like this can help to improve efficiency in the transaction process. The SPL allows for all data to be transmitted in real time to all approved users with minimal latency. This will likely help to reduce the overall transaction time by reducing much of the waiting done between steps.

The SPL system would also improve transparency for the users. Users would be notified when approvals are given in the process, and when they are required to make an action. Participants would no longer need to call their agents or lawyers to get an update on the status of their transaction – they could simply log into the SPL and see for themselves. The existing system requires that a lengthy title search be conducted to ensure the property title being sold is free of defects. In our proposed system, the requirement for this search should be greatly reduced. The SPL will contain an easily accessible history of all previous

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**Figure 2 – Smart Property Ledger (SPL)**

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transactions on any asset, i.e., the property being sold, and enable a title search to be done much more quickly and with more confidence in its accuracy and legality.

**Conclusion**

This paper has discussed the current state of the Canadian real estate market and the impact blockchain technology could have on it. Special focus was given to the impact the technology could have on transaction costs, transaction times and fraud deterrence in this market. Blockchain based bidding and transaction systems were introduced which could help to improve the transaction experience for each participant by increasing transparency and the accuracy of the data. This research is a work in-progress. The scope will later be expanded to quantify the benefits and costs of the systems introduced here. The techniques and solutions will also later be applied to other markets outside of Canada with similar real estate systems in place. When the research described here is complete, it may have a significant impact on practical implementations of blockchain technology within the studied jurisdictions and could point to further research in industries that have similar characteristics to the real estate industry.

**REFERENCES**

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