Digitalization of Land Records: From Paper to Blockchain

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Arturo Castellanos
College of William and Mary

Raquel Benbunan-Fich
City University of New York - Bernard M. Baruch College

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Short Paper

Raquel Benbunan-Fich
Baruch College (CUNY)
New York, NY
Raquel.Benbunan-Fich@baruch.cuny.edu

Arturo Castellanos
Baruch College (CUNY)
New York, NY
Arturo.Castellanos@baruch.cuny.edu

Abstract

This research in progress discusses two country use cases of land record modernization by adopting blockchain technology. Through the cases in Honduras and Georgia, we examine how socio-political and technical issues influence the IS readiness of public organizations when adopting an emerging technology. While both countries partnered with private firms to gain expertise in blockchain, one case was less successful than the other. In Honduras, the lack of a comprehensive country-wide land registry with valid and complete land records, as well as political resistance to changing the status quo, put a stop to the blockchain project. In contrast, a strong public private partnership with political buy-in, along with more modern and reliable digital land records, facilitated the adoption of blockchain for land registry in Georgia. The analysis of these two cases helps to identify enabling and constraining factors related to the digitalization of public records and the adoption of land-registry blockchain initiatives. While these projects do not rely on invention of new technology they do require process redesign and technological readiness. As these two cases show, the combination of socio-political factors with technology-related factors such as infrastructure and readiness create the conditions for the success or failure of advanced digitalization initiatives.

Keywords: Blockchain, Digitalization, Land Records, Public Private Partnership, IS Readiness

Introduction

Land registration refers to a system whereby ownership and land-related rights are recorded by a government entity. These records provide evidence of title, facilitate transactions, and prevent fraud. Out-dated land registry systems introduce delays in ownership verification, slow down legitimate transactions, and in the worst-case scenario, could enable land misappropriation (Dobhal and Regan 2016). According to the World Bank, 70% of the world's population lacks access to land titles. For citizens, the status of land rights can affect their access to economic opportunities. For governments, records of land ownerships are essential to collect taxes, provide services, and establish its territorial authority. Given the importance of land registration for economic development, the World Bank has been spearheading efforts to improve land registration in several countries. It also sponsors an annual Land and Poverty Conference and various Land Registration projects to improve and modernize out-dated registration systems (Heider and Connelly 2016).

In developing countries, the challenge is twofold. On the one hand, securing land property rights is a key factor in promoting economic development. Land rights are essential to promote economic growth, address economic inequalities, alleviate conflict management, and support local governance processes (Roth and McCarthy 2014). In addition, reliable land ownership records increase property values, and reduce lender risk (Domeher and Abdulai 2012). On the other hand, in developing countries land records are typically kept on paper in a centralized location. This paper-based system is not only cumbersome to access and maintain but also vulnerable to natural or man-made disasters. Thus, government agencies in developing countries are exploring ways to digitize land records to reduce the vulnerability of single-copy paper-based titles, and increase the reliability, authenticity, and transparency of the land registration system (Dobhal and Regan 2016). Due to the involvement of multiple stakeholders, such as parcel owners, government agencies, and financial institutions, land registration is a complex process. At the core, all the parties need to trust the system that keeps track of land ownership, and the legality of the titles registered therein.

While property information varies by country and jurisdiction, and it is regulated by specific legal frameworks, the goal is the same: to provide a system for recording titles of ownership and facilitating the legal transference of land property rights. This approach could combine processes and steps into a single system and potentially increase the transparency associated with making records publicly available in a secure environment, reducing fraud and helping resolve ownership disputes (Shelkovnikov 2016).

In this paper, we explore the process of digitalization of land records using Blockchain technology by focusing on two contrasting land-registry Blockchain implementation initiatives: Honduras and Georgia. Through interviews and analysis of secondary data, we provide evidence of the origin, trajectory, and eventual stoppage of a promising project in Honduras, which at the time was the forerunner in the area of land registry (Colindres et al. 2016; Lemieux 2016). We also analyze secondary data to study a similar but more successful land registry project using Blockchain in Georgia. We believe the field of Information Systems by virtue of its focus on topics such as database technologies, IS success, adoption, diffusion, enabling factors, and trust, can provide guidance in developing prescriptions to increase the likelihood of fruitful implementations of blockchain-related projects (Grimsley and Meehan 2007; Orlikowski 1992).

Given their novelty and technological sophistication, blockchain applications require knowledge of cutting-edge technology, which is usually scarce in the public sector. In addition, they introduce a decentralized governance paradigm (Risius and Spohrer 2017). Typically, when government agencies lack capital, human, and technology resources to undertake these innovative projects, public entities partner with the private sector to secure the necessary expertise. In theory, these public-private partnerships (PPPs) are mutually beneficial by giving the public sector a vehicle for collaborative innovation, and the private entity a mechanism to showcase their expertise and contribute to society. In practice, these partnerships are one more factor to consider when assessing the readiness of an organization to undertake the implementation of an emerging technology. The research question motivating this study is: Which factors affect the IS readiness of a public organization when adopting an emerging technology such as Blockchain?

To address this question, we introduce a theoretical framework that studies the politics of technological innovation in the public sector. The remainder of this paper is structured as follows: the next section provides the theoretical foundations and an overview of Blockchain technology. Next, the paper describes two case studies of the adoption of blockchain technology for land registry. The discussion section elaborates on the enabling and constraining factors for IS readiness, and derives lessons for the success of these and future projects (and how information systems research can provide guidance).

Theoretical Framework

Consistent with prior literature, we define IS readiness as how well a company will adopt an IT solution and will derive benefits from it (Haug et al. 2011), or as precursor condition (or set of conditions) for the successful implementation of an IT innovation (Guha et al. 1997). IS readiness is influenced by both technological and organizational factors. For public sector entities, organizational factors have a political component. Peled (2001) argues that public IT innovation is a 'negotiated good' stemming from a distinctly political process (p. 184), and develops a theoretical framework to explain the success (and failure) of IT projects in public organizations. Peled's framework sees public innovation as a political process that "propels organizations to launch a significant new public project that alters rules, roles, procedures and structures." (p. 189). While these projects do not rely on invention of new technology, they do require process redesign and technical competence to implement cutting-edge innovations. Therefore, individuals who fear that their power or status is negatively affected by the new technology will be strongly opposed to the project.

In Peled’s framework (Figure 1), public technological innovation is a self-organizing system with three stages: issue-networks, coalitions, and institutions.

- Issue-networks are the ad-hoc groupings of politicians, bureaucrats, technologists, and other actors in which new technological ideas or trends converge but with a lack of concrete plans.
- Coalitions are formed when interests converge and a concrete project agenda emerges. Several coalitions may compete against each other pushing alternative technologies.
- Institutionalization occurs when eventually, the winning coalition establishes the dominant design.

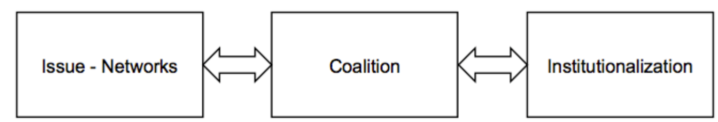

Figure 1. Peled's proposed framework for public innovation

This network-coalition-institution model explains the process of how new ideas penetrate organizations and how actors form issue-networks to explore these ideas. Concrete projects emerge from the coalescence of actors and ideas into concrete plans. At the coalition phase, some powerful actors defend their interests, while other groups are silenced. In the institution phase, winning solutions are codified thereby providing evidence of successful innovations. Failure to achieve these stages signals the failure of an innovation.

For technological innovation, the coalition typically requires a formal agreement between a private entity and the government entity to provide a public asset or service. Existing laws and the nature of the project regulate the contractual obligations between the public and private entities. In this Public Private Partnership, the private entity typically brings expertise but bears some risk in the project. In both blockchain projects described above the PPP was a fundamental enabler for the initiative to take-off, as it provided the technological expertise required by the coalition, increasing the level of IS readiness. This is consistent with previous IS research in that the IS readiness considers the alignment between organizational and technological strategies.

Blockchain for Land Registry

The administration of land and property involves a vast array of documents and supporting data. Existing land information systems are typically centralized ledgers (databases) that provide a system of record of a nation's land transactions. A digital repository affords greater capabilities than the paper-based counterpart but, by itself, digitalization provides no intrinsic transformation to the land registration process. Nevertheless, digitalization of paper-based land records adds redundancy, concurrency, and consistency, characteristics of database systems. Ultimately this can lead to automation and introduce efficiencies to the process at the application layer (e.g., availability of information, protection against catastrophic loss or man-made disasters)(Glaser 2017). In recent years, many governments have leveraged on information and communication technologies (ICTs) to increase openness and transparency (e.g., e-Government, open data initiatives). Distributed databases can help protect these central repositories through replication and duplication. Nonetheless, the integrity of the records is still vulnerable to tamper and fraud by entities in the network that are not trustworthy (e.g., a rogue individual modifying or deleting land records).

The use of blockchain technology for land registry has the potential to address many of the problems that characterize typical centralized recording of titles. The resulting decentralization of control in combination with the immutable representation of transfer of possession gives the opportunity to build collaborative, multi-sided, 'trustless systems' (Glaser 2017). Ølnes et al. (2017) enumerates the benefits and promises of Blockchain technology in Government as a means for information sharing. Blockchain technology is a decentralized peer-to-peer (P2P) network in which each participant (node) maintains a copy of a shared append-only ledger of digitally signed transactions via a consensus protocol (Ølnes et al. 2017). Blockchain applications are typically characterized by whether they are public or private (i.e., who is allowed to participate in the network) and the permission of participating nodes (Buterin 2015). These two factors influence the degree of decentralization. The four types of Blockchain applications in varying degree of decentralization are: (1) permissioned private, (2) permissioned public, (3) permissionless private, and (4) permissionless public blockchain (Figure 2)(Ølnes et al. 2017). (1) The permissioned private blockchain is the closest to a traditional distributed database system in that the owner gives permission to the nodes to join the network and transactions are validated by nodes assigned by the host, providing higher levels of error checking (through multi-signatures or Byzantine Fault Tolerant algorithms), counteracting individual participants from tampering the database. On the other hand, a (2) permissioned public blockchain has no restrictions on who can participate and access the data yet transactions are validated only by a restricted set of nodes selected by the host. In a (3) permissionless private blockchain, nodes can submit information to the blockchain but only the host can access what is recorded in the blockchain. Last, in a (4) permissionless public blockchain (e.g., Bitcoin blockchain) any node can participate and validate transactions in the distributed ledger as long as it solves a cryptographic puzzle (e.g., proof-of-work), ensuring the integrity of the network (Nakamoto 2008). One of the downsides of a public permissionless Blockchain is the high computational power needed to maintain the distributed ledger. A hybrid version of a Blockchain allow transactions to be private but still verifiable by nodes in a public chain such as the Bitcoin network (e.g., hashes of key documents are recorded on a public chain)(Graglia and Mellon 2018).

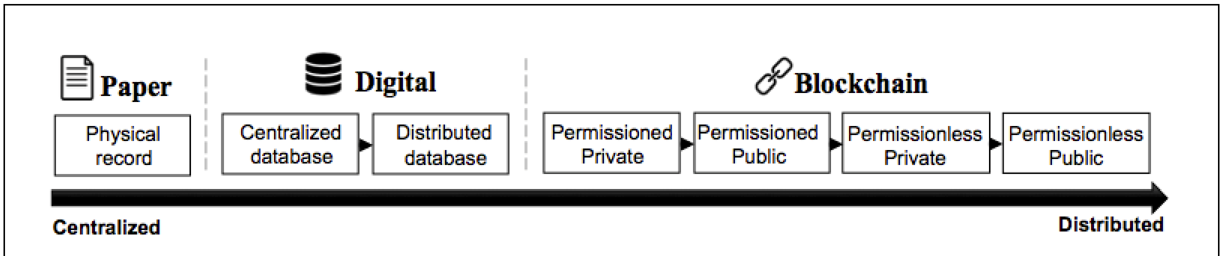

Figure 2. Centralized vs. distributed systems of record

Data changes to land property, including legitimate land transactions or even attempts to tamper with existing records, are new entries on the ledger and produce an audit trail (Lemieux 2016). Blockchain technology, in general, allows for client-defined chains of entries, client-side validation of entries, a distributed consensus algorithm for recording entries, and mechanism for ensuring security. The data is secured by publishing it in an encrypted form (i.e. with a cryptographically unique fingerprint) in the immutable, distributed ledger (Nakamoto 2008). The storage of critical information in the decentralized data layer protects the system from malfunction, obsolescence, and deliberate or involuntary record changes. All critical data records are secured by a "proof of existence" in the blockchain (Lemieux 2016). Every essential step in the registration process (that qualifies as a high "standard of care") can be published to the blockchain. This provides data security and long-term data stability by making the entire data set immutable via notarization. In addition, publishing data during each step of an instrument's recording process provides an irrefutable "Proof of Process", which protects the submitted records and establishes accountability.

It is important to note that Blockchain technology does not help address the accuracy of the land titles (Ølnes et al. 2017). According to Mougayar (2015), 80% of the work in adopting blockchain technology is about changing business processes and only 20% is related to technology implementation. Most of this transformation happens in the background because blockchain is an invisible enabler that does not affect externally visible parts of a business or organizational entity. However, it does require commitment of the involved parties and a sound business process redesign to ensure a successful implementation. In the following section, we discuss some of the design components and process flow of two blockchain projects.

Methodology

We studied two pioneering initiatives of blockchain for land registry to understand how socio-political and technical issues influence the IS readiness of public organizations. Due to the exploratory nature of the study we rely on an inductive approach by analysing two case studies to extend Peled's (2001) theoretical framework (Eisenhardt 1989; Yin 2017). We first conducted two unstructured interviews (via web conference) with the liaison between Factom and the Honduran government. Both interviews were recorded and transcribed. These interviews helped us understand the challenge of land titling, map key stakeholders in the process, and helped us understand the value (and challenges) of blockchain technology in land registry—compared to existing methods. In addition to the interviews, we gathered secondary data from interviews and official sources to help us enrich the data and be able to present two similar initiatives of blockchain-based land registry in two different countries: Honduras and Georgia. To present these cases, we provide brief background on each country and how each project evolved from the first steps until the present time (mid 2018).

Land Registry in Honduras

Honduras is a Central American country with a total population of approximately 8.8 million (CIA 2018). From an economic perspective, the country is characterized by an unequal distribution of income, and high underemployment. Land ownership is unequally distributed and primarily concentrated in private hands, in large estates (latifundios) or smaller lots (minifundios). A large proportion of minifundistas lack title to their land. According to USAID (2018 estimates, the majority of the land privately owned is either untitled or improperly titled. Only 14% of Hondurans legally occupy properties. Lack of clear ownership titles have led to land disputes, conflicts, displacement of indigenous groups, and fraudulent appropriation of land. Invasion of private and communal land has become commonplace (USAID 2018).

Honduras reasoned that legal land titles issued by the central government through a land registration system would provide security that informal documents (e.g., oral agreements, quasi-legal documents) could not (Nelson 2003). Properly registered land claims would give the ability to land holders to defend those claims. In Honduras, each of the 18 Departments in the nation has at least one office where property registry information is recorded. Despite these efforts, the problem with today's Honduran land market is its inefficiency in terms of cadastral deficiencies, incomplete land information, validity of land titles, and a lack of a comprehensive land registry (Nelson 2003). Previous attempts to improve the manual land registry (by digitizing records into a centralized database) were plagued with problems ranging from duplicate titles, to unauthorized changes due to carelessness or corruption (Lemieux 2016). Against this backdrop, the idea to modernize the country's land registry with a distributed tamper-proof blockchain database was born. Honduras was one of the first countries to consider such innovation, and the publicity associated with this initiative improved the country's image worldwide (Colindres et al. 2016).

In January of 2015, representatives from Factom, a technology company based in Austin Texas, and Epigraph, a software title company also based in Texas met with representatives of the Honduran government to discuss the possibility of developing a new system for land registry. The most pressing issue was the lack of backup for the physical land title records. "Land registry books dated into the 1880's, making all of the land wealth stored in those books vulnerable to arson, theft, or misuse" (Colindres et al. 2016). In March of 2015, the Committee for the Adoption of Best Practices (CAMP), met to approve the norms for the new Zones for Employment and Economic Development (ZEDEs). These are new economic zones with flexible and autonomous administration to promote growth and economic development. Factom was involved in several technology initiatives related to ZEDEs' land registry and company creation. The main appeal of land registry at the ZEDE project was that blockchain could be used from the beginning to create new records since their inception. In contrast, the digitalization of land registration records for the rest of the country would require the conversion of existing land titles. This is challenging since it requires additional steps, including the initial allocation of the land rights by verifying the authenticity of existing titles (a resource-intensive task unrelated to the technology implementation).

Factom proposed a blockchain-based solution layer to maintain a permanent, timestamped record on top of the Bitcoin Blockchain. This is intended to establish a record's – e.g. a record of a land transfer's – proof of existence, proof of process and proof of audit (Lemieux 2016). As documented by Lemieux (2016), Factom's data structures consists of: Directory blocks, Entry blocks, and Entries and a process that involves four main steps: 1. Application owner purchases entry credits with Factoid (Factom's token value); 2. The application records an entry—entries in a specific Chain can ignore entries in other chains, limiting the search space while keeping the event history. 3. Factom server creates an entry block and directory block, and 4. Factom creates a directory block into the blockchain. The servers collect Merkle roots of entry blocks and package them into a directory block. If an Application only has the Directory Blocks, it can find entry blocks without downloading every entry block. Entries are validated client-side by users and applications, which reject and keep records of entries that do not follow the rules (Kirby 2015).

The validation process works as a random entry of instrument data to reduce vulnerability in the weakest link. Factom records the process but does not verify the validity of a transfer of ownership (e.g., who the owner is, size of parcel). This validation is done at the client-side (Lemieux 2016). This is a critical component in the case of Honduras since verifying authenticity is a process that goes beyond implementing a technology. One of the weak points in a centralized system is data entry. To overcome this limitation, a

Notary-Registry-Email verification with metadata for a visual verification check was necessary. Once transactions are validated they are stored in the blockchain, else the process starts again. First, the title is scanned and the metadata extracted from it. Three independent individuals verify the information and if all three agree, the instrument passes revision and leaves the system (to join the blockchain). Otherwise, it returns to the registration phase. At the ZEDEs meeting, Factom officials presented the blockchain solution described above. This method could have prevented corruption use-cases that had recently been discovered in the Property Registry (Colindres et al. 2016).

From our interviews, we learned that negotiations to implement the Honduran blockchain land registry and pilot program began shortly after the ZEDE Meeting. The two parties signed a Memorandum of Understanding (MoU) in mid-2015, followed by a non-binding letter of intent for a joint venture between the two sides from the Honduras government. The pilot project (proof-of-concept) would start in the La Ceiba's registry, the fourth largest city. Despite countless press reports about this initiative, the Honduran Government never made any public comments about it—only Factom officials gave updates. They explained the silence of government by arguing that the letter of intent included information that should not be disclosed to the public. At the same time, they admitted the difficulties of working with governments to update land registration systems (Anand et al. 2016). The CEO of Factom wrote in a blog post, "The project is political in nature, and government systems move slower than we all would like" (Kirby 2015). Since this project happened near an election cycle, government officials were reluctant to introduce any major changes that could be used as a threat to the sitting government. Had this project progressed, Honduras would have been among the first countries in the world to implement a blockchain-based land registry. The project was halted in mid-2017 due to the impending Presidential elections and has not been reactivated since then.

Land Registry in Georgia

Georgia is located between Turkey and Russia, bordering the Black Sea, in southwestern Asia. Although only a small portion of land north of the Caucasus extends into Europe, Georgia views itself as part of Europe. Its population is estimated to be almost 5 million—largely concentrated in the central valley and mostly around its capital city Tbilisi on the east. The country was part of the Soviet Union, with a small period of independence following the Russian Revolution. It was forced back into the USSR in 1921 but regained its independence when the Soviet Union dissolved in 1991 (CIA 2018).

In Georgia, buying or selling land was a long process. To notarize the transaction, buyers or sellers had to go to a public registry and pay a flat or expedited fee to notarize the transaction. The process was slow and prone to bribery. In the last few years, Georgia has taken steps to root out corruption and modernize their systems. In 2003, it ranked at the bottom of the Transparency International's Corruption Perception, but it is now in the top 50 (ranking 48th) in this index (Shin 2016). The government of Georgia updated the public registry in 2013, and as a result, Georgia ranks third in the world for ease of registering a property according to The World Bank Doing Business report (Heider and Connelly 2016).

In 2014 BitFury–a San Francisco-based provider of Bitcoin blockchain infrastructure–installed a data center for mining Bitcoin in the city of Gori, with support of the Georgian Investment Fund. The low cost of electricity, preferential taxes (free industrial zone), and the sustainable business and investment environment made Georgia an attractive country for BitFury's foothold (Shalikashvili 2017). In late 2015, BitFury announced its decision to invest $100 million to build a data center in Georgia's capital, Tblisi (Young 2015). A few months later, in April of 2016, BitFury announced a partnership with the government of Georgia to design and pilot a private permissioned blockchain operated by the National Agency of Public Registry (NAPR) and anchored to the Bitcoin Blockchain through a distributed digital time-stamping service (Shin 2016). At the signing ceremony, government officials indicated that this project would cement their efforts to increase transparency and show that they can lead in changing the way land titling is done (Shin 2016).

These investments and relationship building interactions certainly helped foster a collaborative environment prone to succeed, as stated by the chairman of the Georgian NAPR Papuna Ugrekhelidze, who indicated that he was "very pleased with the technical progress and looks forward to continuing [their] fruitful collaboration" (Shin 2017). BitFury's executive vice chairman George Kikvadze said the choice of partner enabled the pilot projects to move forward more quickly and efficiently: "we found the right partner in the Georgian government" (Shin 2017). After a successful pilot project, in February of 2017, Bitfury and the Georgian NAPR signed a new MoU (memorandum of understanding) to expand the system. BitFury representatives indicated that the software would be fully operational later that year. This project shows Georgia's commitment to increase transparency and rebuild trust in the land registry process. Georgia's property registration systems were ranked third according to the World Bank worldwide ranking (Heider and Connelly 2016), which gives additional assurances that the information entered into the blockchain-based system is valid and accurate (Shin 2017). Distributed digital time stamping allows NAPR to verify and sign a document containing proof of ownership of property. According to Georgia's NAPR, since the land-registry project was implemented in 2016, nearly 1.3 million documents have been uploaded (Jardine 2018).

Discussion

Any technological change requires IS readiness. The notion of IS readiness suggests an extension to Peled's framework (see Figure 3). Once the coalition is formed, it is important for that coalition to assess whether they have the infrastructure to push a technology or if a different coalition needs to be formed to establish the required foundation first. In the case of Georgia and other former soviet republics, their recent foundation as independent countries allowed them to embrace more modern technologies than countries established centuries ago, like Honduras. As a result, in the path towards blockchain, Georgia's records were already digitized and ready to be moved to the blockchain; whereas in Honduras, there is an additional task of digitizing paper records. As stated by Guillermo Peña, executive director of policy think-tank Eleutera in Honduras: "*After the titles are digitized, the country may consider blockchain - a ledger system tracking digital information –to ensure transparency and efficiency for owners and investors.*"

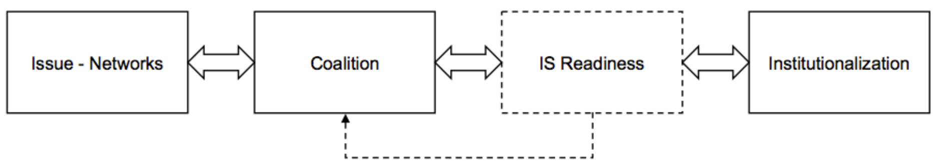

Figure 3. Extended Peled's framework with IS readiness

The comparison of Honduras and Georgia blockchain land registration cases offers important lessons for Governments looking to implement emerging technologies. Adopting blockchain technology for land titling is a more challenging endeavour in Honduras than in Georgia, given the conditions existing in both countries at the beginning of the project. According to the World Bank's Doing Business report (2016), in 2018, Georgia ranked 4th in the *Registering Property* index, whereas Honduras ranked 91st. On average, in Georgia it takes 1 day and 1 legal procedure to register a property. In Honduras it takes on average 29 days and 6 procedures. On the one hand, the sophistication of the IT infrastructure (a key component of IS readiness) varies between the two countries—Georgia is ranked in 61st place according to the United Nations e-Government Survey whereas Honduras ranks in the 127th place. Moreover, Georgia has a high e-government development index (EGDI) compared to that of Honduras (0.6108 vs. 0.3611) and a more robust Telecom infrastructure. Additionally, the approach towards handling corruption is also different. While Honduras ranked 112 in the worldwide Corruption Perception Index in 2015, Georgia had already moved to 48 (due to its earlier efforts to fight corruption). Differences in this index provide an indication of the entrenched political interests that could have a stake against a system that increases transparency.

For land registration, readiness factors include adequacy of business process and legal issues. For example, whether blockchain documentation remains valid if it is not written on paper, or whether the data converted into the system is valid. These issues require broader regulatory changes, and stricter controls once the system is put into place. For a country like Honduras, it would be easier to enter new data into the blockchain system, than to convert existing titles in the absence of transaction (e.g., ownership transfer). If this were to be implemented in zones of economic development (ZEDE), all the titles would be new thus they could be created in the blockchain. However, for the rest of the country, where physical records exist, an extensive conversion effort would be necessary to move existing land records to the blockchain by using two parallel processes—one that prioritizes titles that are subject to change due to buy/sale transactions, and another that converts existing titles with no modifications.

Aside from business process and regulatory issues, a critical issue to ensure IS readiness for cutting-edge innovations in the public sector is technology expertise. When this expertise is provided through a PPP the alignment between the two sides is key. In the case of Honduras, the interaction between the government and the technology company was relatively new and sprung up from another related project (ZEDE). The partnership could not be successfully established in Honduras, given the misalignment of interests between the two parties. The private partner's desires to advertise the initiative clashed with the public officials' goals to keep it under wraps to minimize resistance. In contrast, the PPP relation in Georgia was different. Not only had the technology partner (BitFury) already established a foothold in the country with prior investments, but also the government itself had taken steps to modernize its infrastructure and increase transparency. Both parties in Georgia's PPP were proud of the project and willing to talk about it, as their interests were aligned in the pursuit of the same goal.

In sum, any change in business processes in the public sector requires a combination of technology expertise, infrastructure readiness, and mechanisms for overcoming resistance. When the change involves the adoption of new technology, partnering with private firms offers a vehicle to access technology expertise. The innovation can only succeed if the underlying records and infrastructure are ready for the transformation, and if there is cooperation from all the parties involved, including mechanisms to neutralize resistance from entrenched interests. All of these factors contribute to IS readiness with is a pre-condition to successfully move from coalition to institutionalization.

Conclusion

The analysis of these two case studies helps to identify enabling and constraining factors related to the digitalization of public records and the adoption of land-registry blockchain initiatives. While these projects do not rely on invention of new technology, they do require IS readiness. Regarding technology, the organization needs to assess the state of their IT infrastructure, and redesign processes. The experience of Honduras also emphasizes the importance of IS readiness to propel an innovation. The underlying infrastructure and processes play an important role in the feasibility of blockchain digitalization of land records. In this case, the creation of a PPP brought the necessary technological expertise but exposed the initiative to the risks stemming from the misalignment of interests between both parties. In contrast, the Georgia case illustrates how IS readiness is achieved by combining an appropriate infrastructure with a successful partnership with a technology firm. We believe that information systems research can provide direction in future development and implementation of blockchain-related projects in the public-sector, particularly in developing countries. Future work will include additional interviews to other key stakeholders and add additional initiatives of using blockchain for land titling in Brazil, Sweden, and Dubai.

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