

Review

Toward Smart Land Management: Land Acquisition and the Associated Challenges in Ghana. A Look into a Blockchain Digital Land Registry for Prospects

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Abstract: Land acquisition in Ghana is fraught with challenges of multiple sales, numerous unofficial charges, unnecessary bureaucracies, intrusion of unqualified middlemen, and lack of transparency among others. Studies have suggested digitization as a way forward to improve Ghana's land management system and to address these acquisition challenges. However, none of these studies have specifically provided a clear conceptual digital framework for land acquisition. Most contemporary land literature globally appraise blockchain technology as a potential solution to these challenges in Ghana's land acquisition process. This article applies an integrative review, mixed with strengths, weaknesses, opportunities, and threats (SWOT) analysis, and deductive lessons from a digital land registry concept to develop a blockchain-based smart land acquisition framework solution in view of Ghana's land acquisition challenges. However, it is identified that threats of sabotage of this framework exist among some customary land owners, land officials, and private blockchain-based land experts for various reasons. Among others, a legal basis for a public-private partnership is recommended particularly to discourage sabotage from private blockchain-based land experts. We recommend future research works to delve into establishing a framework that can be used as a guide to assess the readiness of land management and land administration systems for blockchain consideration in sub-Saharan Africa, particularly Ghana.

Keywords: smart land management; land acquisition process; public lands; customary lands; blockchain; Ghana



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1. Introduction

Land acquisition in Ghana is organized along two main lines: Customary and statutory or public. This is because, in a broader view, land in Ghana falls under customary and public management [1–3]. Customary lands are managed on the basis of customary laws and traditions of specific traditional/customary areas in the country. Public lands on the other hand are managed on the basis of State laws and Acts. Customary lands make up 80% of lands in Ghana, while public lands make up 20% (18% being lands compulsorily acquired by the State from customary authorities, and the remaining 2% being lands whose legal management has been vested in the state to act as trustees on behalf of the customary owners) [1,3–5]. Customary lands therefore provide the largest market base for land acquisition in Ghana, both for private individuals and corporate bodies. This is similar in some other African countries like Uganda, Kenya, and Zambia [6–11]. Quaye [4] noted that between 70% and 90% of land market participants across Africa rely on processes involving customary institutions when making land transaction decisions. In certain instances, the government falls on customary authorities to acquire land for governmental projects in the interest of the people [10,12,13]. In Ghana, government's land acquisition is usually done through the power of eminent domain/escheat, otherwise known as compulsory acquisition as provided under Article 20(5) of the 1992 constitution of Ghana, and under the

State Lands Act 1962 (Act 125) [14,15]. Although public lands offer an alternative market for land acquisition to private individuals, and corporate bodies, land acquisition from the public lands is to an extent, on a limited basis. This is because public land acquisitions have certain restrictions that make it difficult for open accessibility by all individuals. Article 20 clauses (1) and (6) of the 1992 constitution makes this clear. Article 20(1a) permits the State to compulsorily acquire any land in Ghana for such purposes as is *“in the interest of defence, public safety, public order, public morality, public health, town and country planning or the development or utilization of property in such a manner as to promote the public benefit.”* Clause (6) further states that *“Where the property is not used in the public interest or for the purpose for which it was acquired, the owner of the property immediately before the compulsory acquisition, shall be given the first option for acquiring the property”* [14] (pp. 24–25). This clause creates a limitation on the availability of public lands to all people and this pushes most people to fall on the customary sector for land acquisition.

For public land acquisition, a prospective purchaser makes an application to the Lands commission (L.C) [5]. There are formal steps laid down such as: Receipt of the application by the lands commission, approval of the application, invitation of the applicant for inspection, and thereafter, beginning the processing of the purchase through the opening of a file on the land, preparing the site plan and cadastral plan, among other formalities. The payment of all administrative costs including costs of registration are made before the final registration in the name of the purchaser [5,16]. Customary land acquisition on the other hand involves visiting the customary land owners to declare one’s intentions for a piece of land to purchase. Depending on the customs of the particular customary area, and availability of land, the prospective purchaser is taken to see the land [5,17]. The necessary customs are performed and the price for the piece of land is paid [17]. Regardless of the source of land, whether it is from the public or the customary sector, land acquisition in Ghana has been criticized to be fraught with several challenges. Among these challenges are: Double sales of land, difficulty in getting reliable land information by prospective purchasers, numerous unofficial charges in the acquisition processes, issuance of unreliable land documents to innocent and unsuspecting land purchasers, fraudulent land transactions, delayed delivery of land documents, and long processing times for concluding land acquisition, among others [4,5,18,19]. These challenges have been responsible for many other problems in the land sector: Land disputes and litigations that lead to deaths in some cases, the use of armed thugs (commonly referred to as land guards) who are kept on the land to scare off or beat counter claimants just to protect land, and also a huge backlog of land dispute cases at the law courts of Ghana that ultimately affect the pace of delivering justice in the court system [18]. In attempts to resolve these issues, both the public and customary land management institutions have put in measures to provide for well-structured land acquisition mechanisms through the customary land secretariats system (CLSs), the deed registration, and the title registrations systems [19]. Although these are in the right directions, the majority of the challenges still persist. This has been attributed mainly to the manual or paper-based approach to land transaction processes in the Ghanaian land sector [19]. This manual system hinders accessibility to credible land information, it does not permit real-time update of land transaction records, and again, it hinders transparency amongst stakeholders to land transactions [20] especially where some parties have selfish motives. To overcome the challenges of the current acquisition processes and to enhance land acquisition, digitizing land management processes have been recommended by many studies as a way forward in Ghana’s land system [17,21,22]. In contemporary times, many land management systems have turned to digitization given the enormous benefits of a digital land management system like faster and convenient land services delivery, improved transparency in land transactions, and enhancement of trust among stakeholders [23]. This move toward digitization is also partly due to the presence of technological alternatives in modern times (especially smart technologies like blockchain and artificial intelligence) that support such a system. This study relies on documented secondary data on land management and land acquisition in Ghana, documented data on

blockchain's potentials to land management, and on documented metadata of a digital land registry concept by a private company, BenBen in Ghana, to address the following research objectives:

1. To assess and identify the main challenges of the current land acquisition processes in Ghana.
2. To explore opportunities and ways to address the land acquisition challenges.
3. To conceptualize a smart land acquisition process that can help eliminate the identified challenges in the land acquisition processes in Ghana.

In the subsequent section, the study provides an overview of smart land management concept and blockchain technology. This is then followed by the theoretical perspective and then methodology. The findings follow next, and a discussion of the findings is made thereafter. The study ends with a conclusion.

2. Smart Land Management and Blockchain Technology

Technological application to land management is not new, as many advanced countries including the Netherlands, Germany, and the United Kingdom among others have had digitized land management systems for many years now. In some developing countries across the world like Ghana, Nigeria, and Honduras, however, this could arguably be somewhat new as land management in these areas has predominantly been manual and paper-based [21,24,25]. Employing smart technologies for land management services and processes underline the concept of smart land management. In this context, smartness is defined by [26] (p. 5) as *"the combination of both smart citizens, who are able to use information and communication technologies to advocate and pursue their interests, and on smart information-processing, i.e. facilities which can fuse data from all types of sources and platforms."* Chigbu and others [27] corroborate this definition and noted that although some technologies could be employed passively, the issue of smartness goes far beyond the mere uptake of the technology, to include the alternative manners in which citizens express their voice and claim their rights. Consequently, applying smart technologies to land management, de Vries et al. [26] define smart land management as land interventions that rely on both passive and/or active information sensors (generated by technological means and also based on voluntary and structured information contributions by citizens) before, during, and after the decision-making process with regards to land. In [28] (p. 274), they also define it as *"the kind of processes that uses social technologies, volunteered geographic information, and crowdsourcing in combination with technical drivers of intelligent information systems and big, linked, and open data."* Smart land management strategies can facilitate the efforts toward sustainable development [29]. This is especially true in the sub-Saharan Africa region, where the largest source of employment to the population is dependent on land [30] and yet have high land institutional and management weaknesses. The discussions in contemporary land management literature on smart technologies for land management thus become very relevant in the context of the sub-Saharan Africa region. Smart technologies for land management according to [26] are persuasive and disruptive in functionality. *"Technologies are persuasive if they come without coercion, manipulation, or deception and yet change socioeconomic relations, perceptions and expectations."* They are disruptive where their innovations displace and replace existing socio-organizational structures and workflows, interpersonal and inter-institutional relations, utilization of technologies, and societal situations [26] (p. 279). Smart technologies for smart land management operate in ways that change the conventional processes of land management systems that do not better address associated land challenges, or that are less robust to deliver the expected land management results for citizens. These changes can occur in part of a land management process or by means of a complete overhaul and replacement of a specific land management process. In essence, smart land management complements the traditional land management processes by establishing omnichannel services (i.e., enterprises that use both online and offline channels for communicating and distributing their products) [31]. In addition to smart technologies application, smart land management relies on citizens that have the

capacity to utilize information technology to advance their courses of actions and interests in a more efficient manner. Hence, a smart land management system is one that seeks to address land challenges through Information communication technology (ICT)-based solutions on the basis of multi-stakeholder connection and transparency. A well-known technology with such a functionality is the blockchain.

Blockchain technology has received numerous citations in recent land studies in relation to smart land management [32]. Among other benefits to land management, blockchain is acknowledged for potential changes in land management by creating a more open, democratic, and trusted system [32–36]. The potentials of blockchain, coupled with the recent ongoing discourses and advocacy toward smart land management, form part of the underlying factors accounting for the reasons why several countries, and scholars, are piloting and writing about the technology respectively [23,32,37–44]. In these different studies, the benefits of blockchain as a smart technology for land management have centered on its ability to enhance transparency, trust, and land data security. It also enhances data quality, accuracy, and integrity through a consensus mechanism amongst stakeholders, and again, it allows for easy information accessibility, traceability of land records, elimination of fraud, corruption, unscrupulous manipulation of land records, and multiple sales of land [20,40–42,45–50]. The benefits of blockchain are not limited to land management alone, but to other public administration fields like the finance sector, and supply chain management. This has led to increasing global attention on blockchain across diverse disciplines as is evident in the numerous international conferences, workshops, and seminars focusing on blockchain technology. These programs aim at bringing practitioners, scholars, and policy-makers together for knowledge sharing and awareness creation on the potentials and new possibilities of blockchain, and how to maximize these possibilities in both the private and public sectors alike. Examples of such programs in the year 2020 included: Virtual Roundtable Webinar on the Impacts of Blockchain Technologies on Land Registries and Land Governance (7th October, 2020), Blockchain Africa Conference in Johannesburg, South Africa (11–12 March, 2020), European Blockchain Convention in Barcelona, Spain (20–21 January, 2020), Paris Blockchain Week Summit (9–10 Dec, 2020), Supply Chain on Blockchain Conference in Fishburners Event Space, Brisbane, Australia (13th July, 2020), and Blockchain Expo Global in London (17–18 March, 2020).

In the recent years, different countries including the Republic of Georgia, Canada, Japan, Sweden, Brazil, India, Honduras, and Ghana among others have introduced and/or attempted the introduction of blockchain into their land management systems on both private and public basis for different land administration functions; land titling and registration, land recordation, and land information management [43,49,51–53]. The outcomes from these applications have been subject of professional and academic discourses. These discourses have among others focused on whether or not the technology is mature enough and ready for employment to land management given the nascent nature of the concept of blockchain in the land sector. Many writers believe that the technology is mature enough to effect greater changes to land management, while others still argue that the technology is new and not mature enough for land management and land administration functions in full course [38,46,47,54,55]. These different positions have raised some quandaries, and questions in the land discipline at the global level. This makes further research timely and opportune, specifically toward evaluating the application situations of blockchain technology in the land sector. Such research works will enhance and enrich the conceptualizations and understandings surrounding blockchain's application to land management. In the sub-Saharan African region, there exist limited literature specifically dedicated to looking at the actual application situations of blockchain technology in support of land acquisition, despite attempts, deliberations, and/or considerations for its general application in land management and land administration in countries like Ghana, Kenya, Rwanda, Zambia, and South Africa [56]. This study therefore fills this gap in the literature using deduced lessons from a blockchain-based digital land registry concept in Ghana.

Following the discussion and given that the idea of smart land management looks at how existing systems and processes could be altered and/or replaced through ICT-based solutions, it evokes the notion of producing new ways, systems, or processes for enhancing land management. This idea is underpinned by production and reproduction of systems and is explained by structuration theory as presented in the section below.

3. Theoretical Perspective

Based on Ghana's unique land tenure and land acquisition system, the structuration theory (ST) provides a better way to understand the system [32]. Structuration is the production and reproduction of a social system interaction [57]. ST hinges on the differences between systems and structures. "A system is an observable pattern of relationships among actors," while "Structures are the rules and resources that actors depend on in their practices." Structures underlie the patterns that constitute systems. A rule is any principle or routine that can guide an activity, while a resource is anything else that facilitates activities [57] (p. 76). ST provides an apprehension of human work as a social interaction within a culture, and this interaction is facilitated by artifacts (resource) such as tools, rules, and procedures, which are open to change [58]. Employing a technological tool in mediation of a land management process toward a desired output is thus contingent on the ST. Blockchain thus constitutes a resource or an artifact in context of its application to facilitate land acquisition processes. In [32,59], the writers note that structuration theory is applicable to or translates into information system research. This idea "moves the traditional dichotomy between structures and agencies to an analytical (rather than empirical) level, and can help in understanding if and how a land management system reproduces existing structures by facilitating established courses of action" [32] (p. 139). Agents refer to humans who draw on structural resources [32]. Production is when agents base on rules/resources to act meaningfully, while reproduction is when those actions maintain or transform the rules.

According to [32] (p. 140) "Structuration theory is a relevant lens to look at blockchain and land registries, because it allows us to see how social structures are reproduced, and how they may harmonize or clash when they enter in the interplay with new land registries." For example, if a digital land registry is introduced and it provides an alternative to the existing land acquisition process in Ghana, the interplay of the existing system and the digital system to reproduce a much better system or to clash is hinged on ST. In the Ghanaian context, the existing rules on land acquisition processes allow for numerous challenges in both the public and customary land sectors. This is because structures like avenues for inquiries and for searches could unnecessarily delay the process, and this leads to unofficial payments as bribes in some instances just to get the structures to work accordingly. These issues necessitate a reproduction to transform the rules for the better. "Conceptualizing technology in use as a process of enactment opens up a better understanding of how practices change" [32] (p. 139). From a blockchain perspective in transforming the existing land acquisition processes, the existing negotiations and contestations in the current processes will translate into the consensus building among agents on a blockchain system. This and other effects of the blockchain technology open up the current land acquisition process for the necessary changes.

4. Materials and Methods

4.1. Research Area, Approach, and Boundaries

This study is based on the land acquisition process in a sub-Saharan African context, specifically Ghana, as the study area. Ghana has a total land mass of 238,539 km² [5]. The 2010 population census pegged Ghana's population at 24,658,823 and an estimated 60% of this is employed in the agricultural sector [60]. This shows the imports of land to Ghana's economy. The country has a dual land-tenure system organized and managed along statutory laws and customary laws. This dual system in Ghana gives a unique feature and novelty to the idea of assessing the possibility of blockchain technology's application

to the system. This is because, in many areas of the world where the concept of blockchain application to land management has been tested and succeeded like in Georgia, they have single land-tenure and management systems. Ghana was also selected specifically based on the authors' in-depth knowledge and experiences in the land tenure and land management system of the country. In the last decades, efforts toward better land management and land administration systems have been witnessed in Ghana and many other African countries as well. Examples include the Land Right Reform in Uganda [61], the establishment of the Kaduna Geographic Information System (KADGIS) Law of 2015 in Nigeria [62], and the Community Lands Act of 2016 in Kenya [63]. In Ghana, some of these reforms included the National Land Policy (NLP) in 1999, and recently, the Land Bill of Ghana 2019 passed in 2020. Another reform is the Land Administration Project (LAP), which was a joint project of the government of Ghana and partner organizations including the World Bank and others. This initiative was geared towards improving the Ghanaian land sector and land services delivery. Some focus areas under this initiative were land registration to enhance land tenure security for all especially women, resourcing and revamping the customary land sector to improve customary land management, establishment of alternative dispute resolution centers to support the huge backlog of land cases in courts, among others [16]. Despite these efforts, the land registry in Ghana still suffers challenges of inaccurate land data, lack of up-to-date land records, a complex web of land institutions with overlaps that lead to unnecessary bureaucracy, lack of transparency, and a paper-based system that allows for corrupt deals, among others. Similar challenges are identified in the land registries of some other African countries like Rwanda, Uganda, and Nigeria. These challenges and given the authors' rich knowledge in the Ghanaian context make Ghana a study area worth considering in regard of blockchain's potentials for land management, specifically land acquisition challenges.

This review study is based on secondary data combined with semi-informal discussions with field experts, particularly in the area of blockchain's application to land. This approach was considered useful given that the topic area is new and evolving with a limited literature base which makes it appropriate to support it with expert views. A similar approach was used in [17]. Compared to other review methodologies like systematic and semi-systematic, the integrative review method is considered suitable for such new topics as this one [64]. The research methodology was based on an integrative interpretation process of existing documentations and literature, with the aim of re-conceptualizing land acquisition processes in Ghana. Integrative reviews assess, critique, and synthesize existing literature in ways that evoke new theoretical frameworks and perspectives [65,66]. Based on explorative design, the study follows the rationalist theory of sense making as an epistemology to deduct scientific knowledge [64,67]. A researcher's initial acquaintance, understanding, and knowledge thus play a vital role in this methodology as these help to do a critical review and analysis in ways that offer a better opportunity to assess pending developments and to identify factors that are shaping the future of new concepts in the particular field [64,67]. The critiquing and analysis open up relationships, gaps, deficiencies, and contradictions in existing literature. This makes it possible to rethink the topic and to improve scientific knowledge by extension and/or reconceptualization [64]. This method has been used in similar studies [20,68]. Integrative reviews are, however, criticized as a mere summary of existing studies, with no specific standards, and therefore lack rigor compared to systematic reviews [65,66]. In overcoming this, we combined the integrative review with informal discussions with experts, and also with SWOT analysis which permits an effective analysis of an institution's resources and environment to help position it better [69]. This has been used in similar land management studies [70,71].

Based on the objectives of the study, the review focused on discussions on land acquisition in both the Ghanaian public and customary land sectors as a contextual boundary. However, where applicable, literature from other African countries with similarities were reviewed. A combination of text narratives and visual representations or models were used in organizing the study as these are considered suitable organizational strategies for

integrative literature analysis and synthesis [64,67,72]. SWOT analysis was used because the existing land acquisition processes in the country have certain inherent characteristics that, together, can allow for and support the call for the need to design a better alternative. SWOT analysis provides a basis for a strategic planning framework design [71]. This approach guided the study to come up with certain strategies deduced from a matching of the inherent strengths of the land sector to the inherent weaknesses (SW), and also, the external opportunities to the possible threats (OT) to arrive at SW strategies and OT strategies. These strategies, together with lessons deduced from a digital land registry concept, guided the conceptualization of a new framework for land acquisition in Ghana. Literature based on empirical studies and review studies in the English language from all sources was used without any spatial and temporal boundaries. English is the language that the authors have mastery knowledge of and, hence, only literature in English was used to avoid any linguistic biases. The scope of the literature review centered on land tenure, land management, and land acquisition in Ghana, blockchain and its potentials in the context of land management. The next sub-section looks at literature identification processes and sources, reviews, analyses, syntheses, modeling/reconceptualization, and the means of scientific knowledge extension. This is summarized in Figure 1 below.

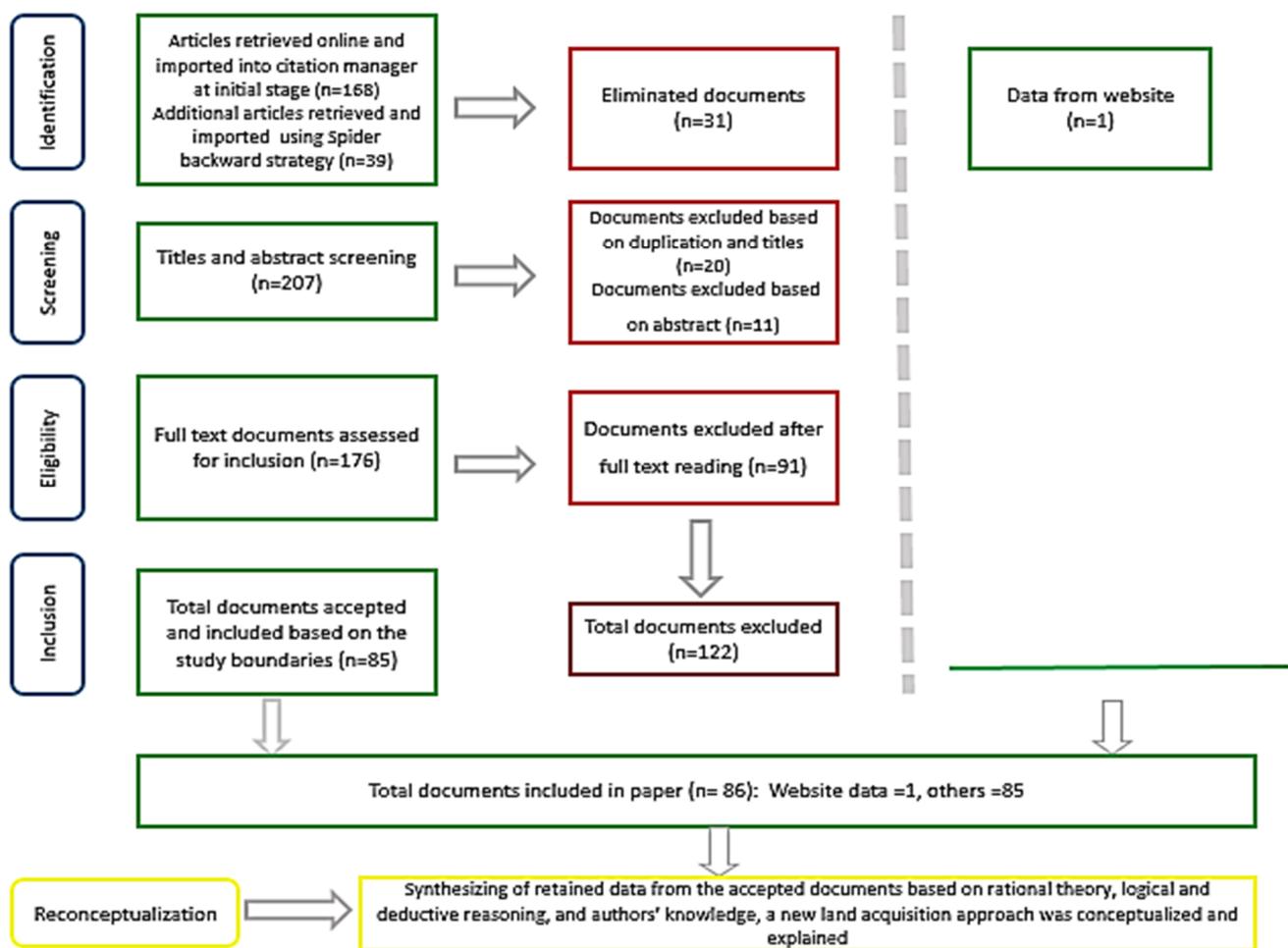


Figure 1. Overview of research design and methods. Source: Authors' construct.

4.2. Research Area, Design, and Methods

Being a review paper, the study is based on a qualitative explorative design. Secondary data were collected from websites and different scientific databases, mainly Google Scholar, Elsevier, Springer Link, Scopus, JSTOR, Research Gate, Web of Science, and Taylor and

Francis. Guided by the main concepts in the study, the literature search was carried out in a systematic approach using keywords and phrases like land management in Ghana, land acquisition in Ghana, customary land management in Ghana, land tenure in Ghana, public and or state land management in Ghana, land challenges in Ghana, smart land management, smart technologies, blockchain technologies, blockchain for land management, land tenure in Africa, land management challenges in Africa, and blockchain and land in Ghana. We used diverse synonymous keywords and phrases across the different scientific databases. This facilitated access to a large volume of documents on the topic, and allowed for a validity and reliability check. The search was concluded when further searches across these different databases continually returned documents that had already been identified, and further assembling only led to duplication. In addition, as is in line with data sampling, when at a point there appears to be no new insights or data coming up other than those that have already been identified, the data gathering is considered to have reached a saturation point and, thus, there is no need to continue [73–75]. The identified documents and the ones finally accepted and used for this study are considered a representative of the topic under study in the Ghanaian context as our search covered the available literature on the topic mainly in the Ghanaian contextual boundary, although references were made to other African countries in certain instances. With regards to documents on smart land management and blockchain technology's application to land management, they are both new concepts and have very limited literature base as the conceptualization and theorization of both concepts are still evolving. The study, however, tried and identified the most authoritative literature in this regard. Aside the above data source, email inquiries and telephone calls were also used to engage some experts in informal discussions on the topic. These provided some essential feedback that constituted some findings, and also guided the analysis and synthesis. At the end of our literature search, the initial search produced 168 documents. The review of these documents started with the reading of titles and abstracts in some instances. This led to elimination of some documents due to duplication, while others fell outside the scope of the research boundaries. In total, 137 documents were retained after this stage for the detailed and critical full text reading. The full text reading helped to identify the extent to which the documents discussed the topic, and revealed the missing gaps, similarities, and contradictions, all of which helped in the formulation of the research problem and the objectives. During the full text reading, relevant citations and references that were identified were traced back to their original sources for identification and review. This strategy is termed as the backward spider literature search [76]. This strategy resulted in 39 more additional documents to make a total of 207 documents in all. The first review stage of these backward spider-retrieved documents, based on the study's boundaries, led to acceptance of 22 of them. In total, therefore, 176 documents were accepted for full text detailed and critical reading and review analysis. In the end, 86 of these documents were accepted and used for the study.

5. Results

This section and its subsections present the results that emerged from the literature review, website metadata, and informal discussions with field experts. The sections focus on public and customary land tenure management, particularly land acquisition processes and associated challenges under both systems. It also presents our findings on a blockchain land registry concept as identified from our informal discussions and retrieved metadata from the website.

5.1. General overview of Land Transactions, and Associated Challenges in Ghana

5.1.1. Public Land Tenure, Land Acquisition, and the Associated Challenges

As indicated in the introduction, public lands in Ghana fall under government's control. Article 257(1) of Ghana's constitution states that "*All public lands in Ghana shall be vested in the President on behalf of, and in trust for, the people of Ghana*" [14] (p. 97). The state has absolute ownership of public lands. These are lands that, in previous times,

belonged to the traditional or customary authorities but have been compulsorily acquired by the Government through the power of eminent domain, for its administrative and development functions [5]. This category makes up 18% of the entire 20% of all lands that fall under government's control and management. The remaining 2% are referred to as Vested lands. Although vested lands had not been compulsorily acquired from the traditional authorities, government has vested the legal management of all such lands in itself [3]. The original traditional authorities that owned these lands, however, continue to hold and enjoy the beneficiary interest and are entitled to certain percentages of proceeds or revenues that the government realizes from such lands [3]. Despite the differences in public lands and vested lands, there is not much difference in transactions pertaining to both land forms. Lands commission (L.C) is the mandated governmental institution that oversees the management of all such lands on behalf of the government, Article 258(1a) [14]. Prospective purchasers go through the lands commission to access both forms of lands. An application for land is first made to the commission and a decision is made on the application. Figure 2 below shows the various procedures involved in acquisition of public lands in Ghana.

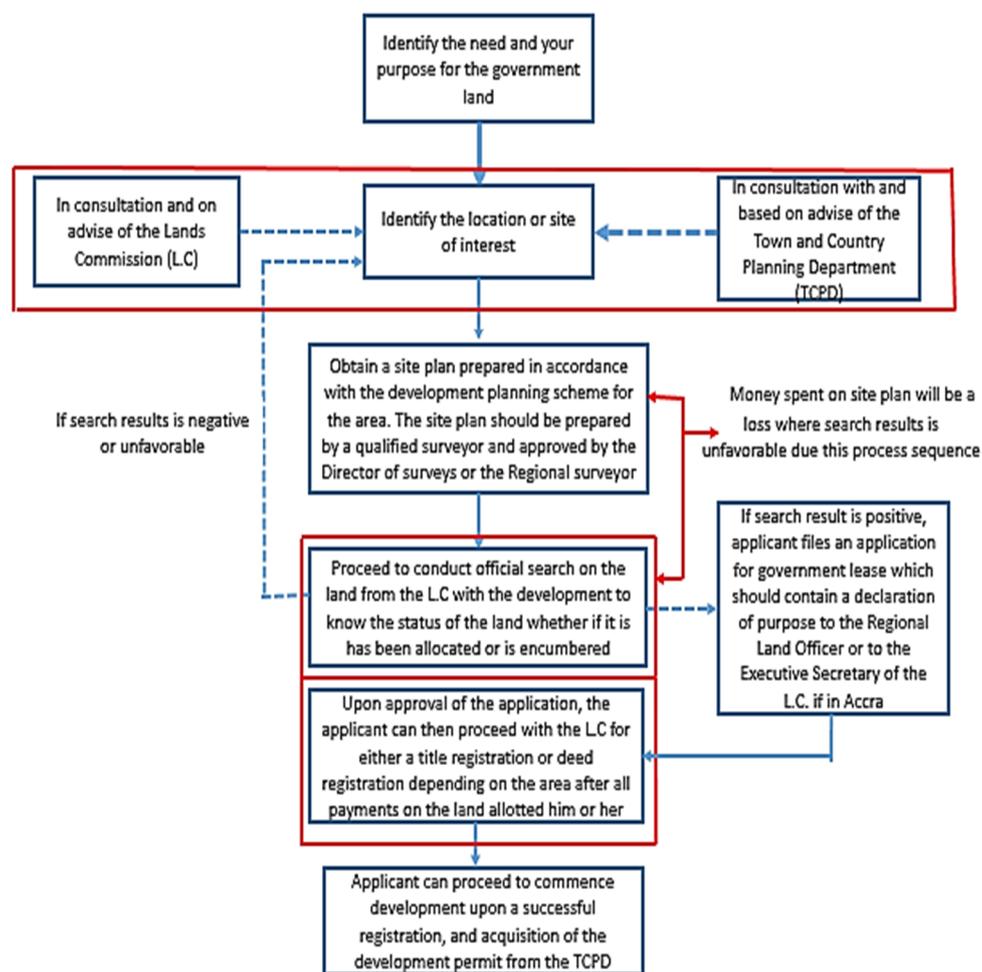


Figure 2. Public land acquisition process in Ghana. Source: Author's construct based on literature.

One will think that the above procedure appears very logical and sequential that—if followed accordingly—could provide for smooth land transactions. However, there are inherent challenges in certain stages of the process that are worth considering. The areas captured in the red boxes above are fraught with certain challenges. The foremost challenge is the high cost involved [47,77,78]. The process has been criticized to be highly costly, which has been attributed to numerous informal charges at the different stages.

Besides the actual purchasing value to be paid for the land and other official administrative charges, there are numerous unofficial charges at the different stages of the procedure, which worsen the plight of prospective land purchasers [16]. As the process is mainly manual and activities between clients and officials are hardly known to other officials, some unscrupulous land officials use their offices to perpetuate the bad ethic of taking unofficial monies from prospective purchasers before they go ahead to carry out their mandated official services, although clients have already paid all official charges. This is made possible due to the lack of transparency in the process and among institutional divisions, and among stakeholders [20,21]. This problem is very pronounced at the second stage of the acquisition process where the clients deal with the different divisions of the Lands commission, and also with the officials of the Town and country planning department (T and CPD). Many such unofficial payments happen at the different offices of these different institutions. In addition, at the stage of conducting a search on the land, most clients usually make unofficial payments to obtain search results. This can be attributed to the fact that within the manual file records-keeping system, it is sometimes very difficult to manually search through many thousands of other files looking for one particular paper file. This could be a daunting task for officials and, in many instances, could take days to weeks to identify such files. This tedious task in many cases is a hurdle and demotivation for officials to start the search process. To get officials to conduct the search as quickly as desired by the clients, most of the clients end up paying unofficial monies to the officials just so they can be motivated to conduct the search and deliver results on time.

A second challenge to land acquisition is the fragmented institutional arrangements, coupled with the overlap of functions due to the lack of consultations and real-time synchronization of actions amongst land institutional divisions, which lead to unnecessary bureaucracies and overlaps [18,77]. This is also found mainly at the second, fourth, and sixth stages of the acquisition process. At the second and fourth stages, as the L.C and the T and CPD work together, it would have been expected that a single search can be conducted at the L.C and results should include the results of the T and CPD. This is, however, not the case, and therefore, clients are faced with dealing individually with these institutions during the search. In addition to this and within the L.C, there are four different divisions, Public and Vested Land Management Division (PVLMD), Land Valuation Division (LVD), Survey and Mapping Division (SMD), and the Land Registration Division (LRD) that clients will have to deal with. Again, at the sixth stage during the registration of the deed or title, which is usually tied to public land acquisition, a prospective land purchaser has to deal with the identified divisions and also the T and CPD. Some of the activities at this stage end up overlapping. For instance, there is an inspection conducted by the PVLMD, as well as the LVD. These are activities that could have possibly been harmonized to simplify the process, which is not the case. Some other less obvious activities, particularly office administrative functions, among the different divisions end up overlapping, which complicates and prolongs the acquisition process with unnecessary bureaucracies and many unofficial expenses.

A third challenge is identified in the sequence of the land acquisition stages. There appears a disarray in the order of the land acquisition process. From the above process in Figure 2, given the order of stages 3 and 4, a prospective purchaser will have to contract a qualified surveyor to prepare a site plan and cadastral plan for them, and pay for it before they proceed to conduct an official search on the status of the land with the plan. This order is criticized on the basis where the search result is negative; the money spent on the plan becomes a loss to the purchaser. However, this order is the case, mainly due to the fact that without such a plan, it becomes extremely difficult for the lands commission to obtain the records on the particular piece of land for the prospective purchaser. Ordinarily, it would be expected that this should not be the case since such lands already fall under the commission's management and must have records of all their lands in that respect. Conversely, the commission largely uses manual records keeping, hence, although most lands that are public and fall under the commission's management, it hardly have the

records captured in their system, especially in newly developing areas where land use planning might not have covered or reached yet. By consequence, when a plan is prepared and the exact plot number and location of the land among other details are known to the commission, an effective search can be done. This is seen as a challenge for prospective purchasers because they could end up wasting so much time and money in the process only to end up with negative search results.

The final challenge identified in the acquisition process is not so much embedded in the stages but associated with a weakness in implementing and enforcing policies that guide the acquisition process [18]. Not only in Ghana is this problem prevalent but very significant across the African continent [2]. This weakness has made way for intrusions of unqualified middlemen into the system [4]. These unqualified middlemen intercept the different stages of the acquisition process, which make it challenging for prospective purchasers. Despite the many divisions and departments involved in the land transaction process, institutional weaknesses in coordinating the works of these divisions, as well as in implementing and enforcing policies, has made way for a lot of unprofessional middlemen to invade the system. Most of these middlemen hang around the lands commission premises, identifying themselves with different offices, and dealing with unsuspecting prospective land buyers. These middlemen in most cases have connections with some of the commission's professional officials that allow them the opportunity to deal with unsuspecting prospective buyers. Apart from complicating the acquisition process stages with unprofessional advices to clients, these middlemen also charge and take huge unofficial fees from the prospective purchasers just to be able to have enough for themselves and for their professional colleagues who help them to be able to carry out such deals. In the worst case situation, a middleman could dupe an unsuspecting purchaser of money and elope with it.

After the above process and identified challenges, when a prospective purchaser's application for the land is finally approved, they then proceed to register the land, and also to get a development permit from the T and CPD before development can commence. These two processes, similar to the acquisition process, are also fraught with many challenges including bribery and corruption, lack of updated land data, lack of transparency, openness and participation for all stakeholders, and difficult accessibility to reliable land information. See Ameyaw and de Vries [20] for details on the procedures involved in the registration and associated challenges.

5.1.2. Customary Land Tenure, Land Transaction, and the Associated Challenges

Customary land tenure holds the remaining 80% of all lands in Ghana, and management is by individual traditional authorities. The traditional authority holds the highest allodial interest [79] in the land, which cannot be alienated. In principle, therefore, it is a usufructuary interest in the form of a lease that is bequeathed to prospective purchasers from the traditional authorities. Different customary areas have different customary laws that govern the management of their lands [2]. Just like the government that holds public lands in trust for the people of Ghana, traditional authorities only hold the land in fiduciary duty for the larger community of the land owning group [2,15,18]. The "*State shall recognise that the managers of public, stool, skin and family lands are fiduciaries charged with the obligation to discharge their functions for the benefit respectively of the people of Ghana, of the stool, skin, or family concerned and are accountable as fiduciaries in this regard*" Article 36(8) [14] (p. 33). On this basis, and especially in the past, acquisition of land from the customary custodians could vary depending on whether a person belonged to the land holding group or not. In recent times however, due to the high demand for scarce land, [5] note that land acquisitions do not necessarily consider whether or not a prospective purchaser belongs to the land owning group, although some considerations are possible in certain instances for some customary authorities. This and others account for the differences in customary land management amongst the different customary authorities in the country. For instance, in the Kumasi traditional area, Quaye [4] notes that land acquisition is in three stages: (1)

Allocation of land by the caretaker or sub-stools, (2) approval by the Asantehene (King of the Ashanti kingdom) as the overlord, and (3) preparation of the lease document within the formal sector. Although formal sector registration under customary land tenure is not compulsorily tied to land acquisition, Quaye [4] notes that it is linked to the acquisition procedure under the Kumasi traditional area. In other traditional areas, one is likely to not see this as a compulsory custom attached to land acquisition and thus highlights another difference among the customary traditional authorities.

It is important to mention that although customary land transactions are not under any compulsion for them to be registered within the formal land registration, certain constitutional provisions and Acts on land render all of such customary land transactions ineffective and invalid from the official and legal point of view until they are formalized within State-established land institutions [77]. This makes land registration necessary even where the land is acquired from the customary sector. Land acquisition under the customary land tenure is consequently linked to the formal land sector, and hence, certain aspects of the acquisition process do involve the government land sectors. Figure 3 below shows the land acquisition process under the customary land tenure system.

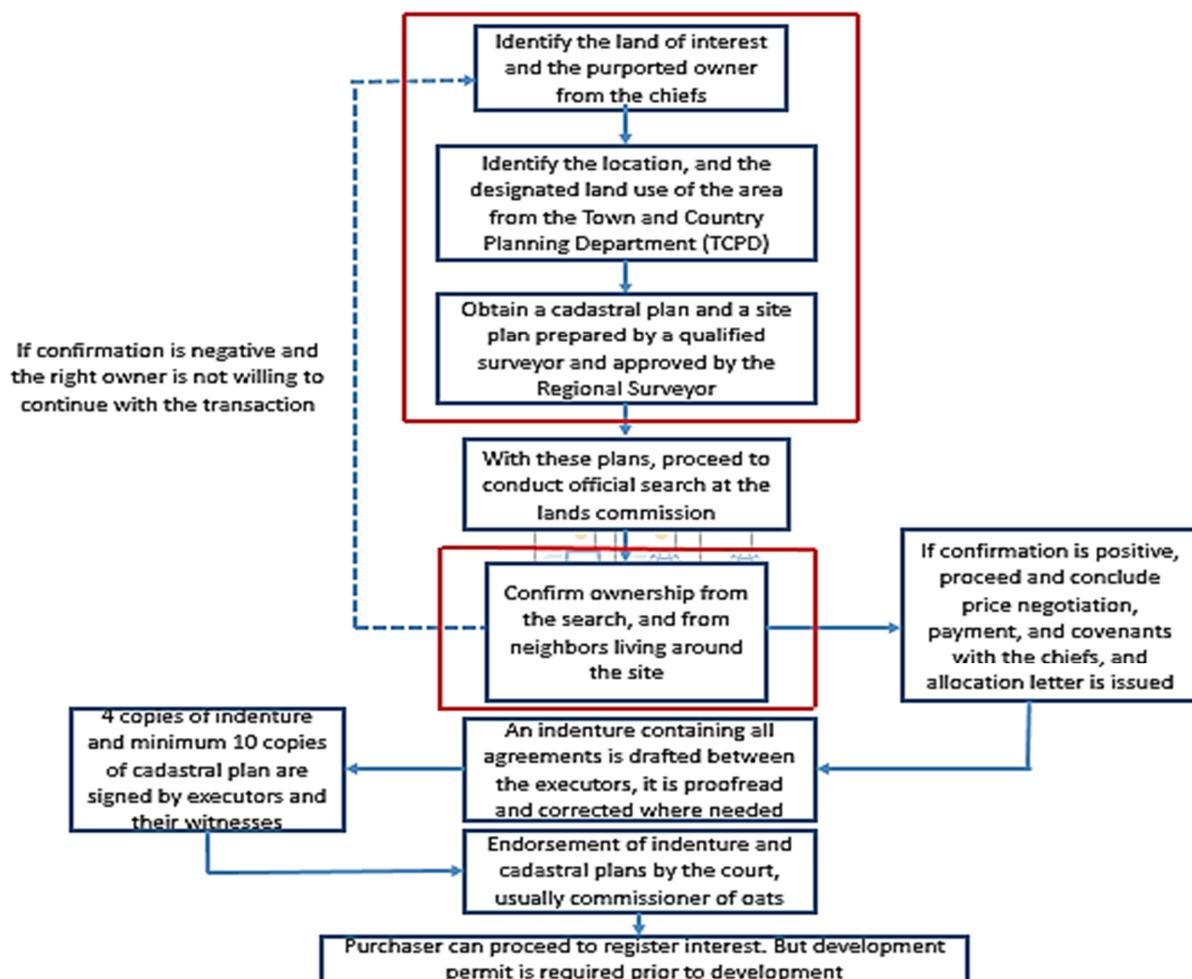


Figure 3. Customary land acquisition process in Ghana. Source: Authors' construct based on literature.

The summarized process above has some inherent activities (customary practices) that need to be highlighted. At the first stage of identifying the land and purported owner, a prospective purchaser visits the customary authority, usually a sub-chief's palace (in the case of the Kumasi traditional area). At the palace, and before the prospective purchaser is welcomed and permitted to disclose his or her mission, they are required first to offer "kola" to the palace elders (typical with the southern part of Ghana). This custom in

modern times is represented by an undisclosed amount of money [17]. After this payment, and disclosing one's mission, a visit, in the company of some elders from the palace, is made to the site if there is any vacant land available. For this visit, the prospective purchaser again pays some money to the elders [79]. Crucial to mention is that these monies are not part of the actual land value. The prospective purchaser after the visit can then verify the designated land use of the site shown to them from the T and CPD. Ideally, the applicant should then follow through the remaining stages, i.e., 3, 4, and 5, to the negotiation of the land value to be paid. However, in many customary areas, especially where registration of the land is not compulsorily attached to the purchasing of the land, this is usually not done. That is, some prospective purchasers fail to consult with the T and CPD and/or the lands commission, but instead, go straightaway to conclude the land transaction with the price negotiation and payment. A survey in Koforidua, one of the southern regional capitals of Ghana, for instance, revealed 68% of respondents failed to consult any land professional during their land acquisition, and the majority of those that did were victims of unqualified middlemen that have intruded the sector [15]. This finding is however different from that which was found in 2014 in Kumasi where an overwhelming 97% of respondents had had some interactions with the formal land sector [4]. These differences can be attributed to the fact that land acquisition in the Kumasi traditional area is invariably linked with registration within the formal sector [4]. The failure to involve land professionals on the part of some prospective purchasers further compounds the already inherent challenges in the system [15], particularly given that government administrative requisites of valid customary land transactions are usually completely different from the terms that such purchasers enter into with some customary and/or private land sellers [14]. After negotiations and payments are concluded for the land, the purchaser is issued an allocation letter from the sub-chief (in the case of the Kumasi traditional area), with which he could go ahead with other documentation processes [19]. This allocation letter is, however, not valid until the overlord for the traditional area has endorsed or signed it as it is in the Kumasi traditional area [17,19].

In line with the acquisition process presented in Figure 3 above, the first challenge for prospective purchasers is the payment of different monies, Kola money, and site visit fees, which happen at the first and second stages in the process above. These monies go into making the whole land acquisition process expensive and a daunting task for many people, especially the local people in most instances. Payment of the kola money precedes the telling of one's mission, and so, if after the mission is disclosed, it is found that there is no vacant land available, the purchaser loses the money. Both the first and second stages preceding the site plan preparation stage, i.e., third, and the search stage, i.e., fourth, are seen as not in the right order. This is because most prospective purchasers end up wasting much money in instances where the official search results turn out that the land is encumbered and cannot be purchased. This challenge provides room for criticisms of the system as one could argue it out as a deliberate extortion in certain instances.

The subsequent challenges of the acquisition process are rather as a result of the manual system of customary land transactions and management. The first is due to the lack of transparency in the land acquisition process [4,15,22]. In many instances, the information received at the chief's palace becomes the only authoritative information to be relied upon to conclude the acquisition, particularly where no formal sector institutions are contacted. Some dishonest chiefs capitalize on this situation to perpetuate the double sale of the same piece of land to different purchasers, which usually lead to land disputes and conflict.

Finally, another challenge is that just like under the public land acquisition, this acquisition process is bedeviled with many bureaucracies that lead to prolonging and sometimes frustrating the acquisition process unnecessarily. First, the prospective purchaser has to deal with the sub-chiefs, followed with the inspection team, and then with the overlord king of the bigger traditional area who will have to sign the allocation letter after it has been issued by the sub-chief [4]. These processes could take too long particularly while awaiting the endorsement and/or signature of the overlord [2]. The time for the acquisition

to be completed, coupled with all the incidental monies to be paid aside the actual value of the land, tends to make the entire acquisition process very cumbersome and challenging for many people [19].

The findings presented on the land acquisition processes under both the public and customary land sectors and the associated challenges call for the need to rethink how these processes can be restructured to eliminate all such procedural challenges. The study uses insights from a digital land registry concept to deduce some lessons helpful for conceptualizing a blockchain-based smart land acquisition framework for Ghana. The next sub-section presents our findings on the digital land registry concept.

5.2. Blockchain-Based Digital Land Registry Concept

Blockchain technology has many different connotations but all draw on the same underlying principle of a decentralized ledger for managing records of transactions in a shared and transparent manner amongst stakeholders. It is defined by [34] as a fully distributed cryptographical system that captures and stores a consistent, immutable, and linear event log of transactions between networked actors. It is a distributed ledger technology that acts as an open trusted record of transactions between and amongst multiple parties that is not stored by a single central authority [80]. This underlying principle of blockchain has caused it to be heralded as the technology to transform the way business transactions are conducted [81]. As iterated by Rijmenam and Ryan in 2019, “it seems that almost any industry that deals with some sort of transactions or tracking mechanisms can and will be disrupted by blockchain” [17]. Blockchain technology has different architectural configurations, mainly public and private, each of which is sub-classified as either a permissioned or permissionless blockchain based on accessibility possibilities. For detailed discussion of these architectural configurations, the blockchain structure, and how the blockchain technology works, see [20].

BenBen is a private blockchain-based digital land registry company based in the capital city of Ghana, Accra. The aim of the company is to create a reliable land information and transactions’ system [21] using blockchain technology. The idea behind this land registry concept is to bring together various actors in the land market such as financial institutions, land sector agencies, and real-estate agencies, and to build end-to-end digital platforms for facilitating trusted, secured, and risk-free land market transactions [82]. This reduces the manual hustle of maneuvering through all the actors during land transaction as identified under Section 5.1. Through the digital blockchain database, land data are secured on the blockchain platform, and citizens are permitted to access these for all land transactions [83]. The challenge of double sale and ownership on the same plot of land particularly underlies this blockchain land registry concept [83]. It seeks to bridge the gap between formal and off-market land data and transactions, by offering land market actors a secured digital environment for accessing rated land information and facilitating land transactions. This is achieved by authenticating the land records of different land market sources with the records in the government’s land registry system [83]. The authenticated records and all other relevant documents are then harmonized and stored in the digital land registry to support land transactions. Figure 4 below shows the digital land registry concept.

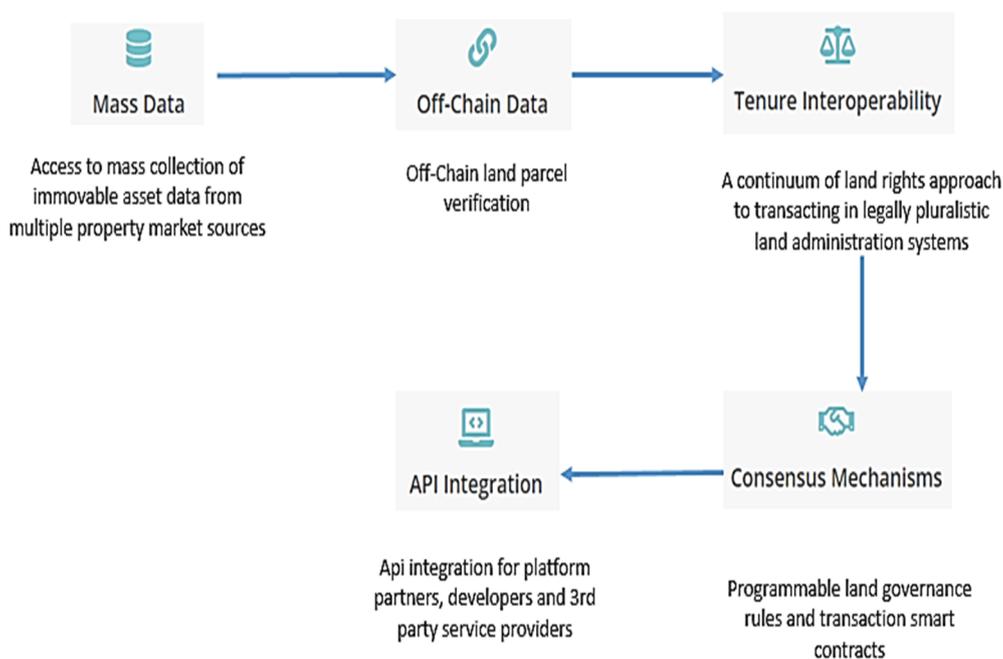


Figure 4. Digital land registry concept. Source: [81].

6. Discussion

6.1. Connecting Blockchain's Potentials to the Identified Challenges to Develop a Smart Land Acquisition Framework based on a SWOT Analysis Output, and Lessons from the Digital Land Registry Concept

6.1.1. SWOT Analysis Output

The findings presented above show similar challenges across both public and customary land acquisitions. Nevertheless, an assessment of the land management system under both tenure forms reveals certain inherent traits and characteristics that can allow for and support the introduction of blockchain technology to help resolve the identified challenges. Our assessment is based on the SWOT analysis (strengths, weaknesses, opportunities, and threats). Strengths represent the internal traits and assets in the current system, weaknesses represent the innate shortcomings of the current system that undermine land acquisition, opportunities are the potential external factors that can improve the current system, and threats represent the potential external factors that can deter and/or thwart efforts to improve the current land acquisition processes. Table 1 below shows the results of our SWOT analysis. This SWOT output combined with insights from the digital land registry concept guides the conceptualization of a new smart land acquisition framework.

6.1.2. Lessons from the Digital Land Registry

From the digital land registry concept presented in our findings, the mass data from different land market sources idea in this concept is crucial to developing an integrated blockchain land acquisition framework for both the public and customary land sectors. This is because, without such a multiple source, the framework can be compromised due to the monopoly power of one sector. This will in the end lead to citizens going back to the land market that is outside of the blockchain system, and the identified challenges will resurface and continue.

Table 1. Strengths, weaknesses, opportunities, and threats (SWOT) analysis output of the current land acquisition processes. Source: Authors' construct.

Strengths	Weaknesses	SW Strategies
<ul style="list-style-type: none"> Formal sector involvement at certain stages in customary land acquisition provides good grounds for further collaboration The two sectors have co-existed in harmony and with sanity over decades, which gives sound basis for collaboration 	<ul style="list-style-type: none"> Lack of proper consultations amongst and within both systems 	<ul style="list-style-type: none"> Establishment of an independent team including both public and customary land officials to oversee credibility of off-chain activities and data, before being brought onto the blockchain system
<ul style="list-style-type: none"> Efforts have started toward digitizing land documents in the formal sector 	<ul style="list-style-type: none"> Lack of transparency in the systems and amongst stakeholders Poor and paper-based record-keeping system 	<ul style="list-style-type: none"> Extension of land records digitization to the customary sector to permit the possibility of blockchain introduction Participatory processes in digitization to allow for all stakeholders to confirm data accuracy before transferring onto blockchain
<ul style="list-style-type: none"> There exist enough land-related professionals to support the system [70] Existence of constitutional provisions and Acts that support both sectors, and also good political will toward land management [70] 	<ul style="list-style-type: none"> Limited knowledge of officials in blockchain Intrusion of unqualified middlemen in both public and customary land acquisition systems Bribery and corruption in both systems 	<ul style="list-style-type: none"> Government together with customary authorities must collaborate to absorb qualified land graduates that are middlemen and train them in blockchain-land uses to support the new system Government's strict enforcement of legal sanctions against all forms of illegal land activities
Opportunities	Threats	OT Strategies
<ul style="list-style-type: none"> Existence of BenBen and Bitland private blockchain companies that deal in land issues provide good learning grounds 	<ul style="list-style-type: none"> New roles and pressures of middlemen who will seek alternative ways of compensating their loss of influence and income 	<ul style="list-style-type: none"> All middlemen who have studied and graduated as land experts but unemployed can be given the right orientation and integrated into both land sectors
<ul style="list-style-type: none"> Lessons could be picked from the success stories of countries like Georgia to serve as a guide 	<ul style="list-style-type: none"> Due to the newness of the technology and limited knowledge of staff from both sectors, external private experts could relent on their support for the system on the basis that it might kick their companies out of the land market 	<ul style="list-style-type: none"> Establish and provide legal basis for a public-private partnership (PPP) with private blockchain-land experts to support the efforts of both public and customary land sectors
<ul style="list-style-type: none"> Some chiefs have well-established customary land secretariats: Asantehene land secretariat and the Gbawe Family land secretariats. These could be good starting points of collaboration on a systematic approach to roll out the system. 	<ul style="list-style-type: none"> Possibility of chiefs, as well as some public land sector officials, to undermine any system that will try to make their activities more transparent and accountable 	<ul style="list-style-type: none"> A consensus should first be reached with customary authorities to solicit their commitment and support for the system

In addition, the off-chain activities can be used to ensure that any land data generated are accurate and true to the grounds reality. This idea can be adopted on the basis of the public-private partnership (PPP) OT strategy in our SWOT output. In this way, parties from the public and customary sectors, as well as private blockchain experts, will

be involved in the verification and acceptance of land data off-chain before credible land data are uploaded onto the blockchain system. The off-chain data verification will involve activities of checking for land ownership status, encumbrances, boundaries, correctness of relevant documents, and their authenticity, and also transaction histories among others. This is especially important for customary lands as the challenges are more pronounced in this sector. The team that undertakes this exercise must include customary people with in-depth knowledge on customary land issues, blockchain experts, as well as specialists like surveyors, land economists, planners, and valuers, from the formal land sector who can ensure data accuracy based on expert knowledge. This PPP is very essential particularly in this area of blockchain introduction to land management as it has been a main contributory factor to the success case in Georgia, and was also employed in Sweden's case [23,40,41,50,53]. The PPP is possible in Ghana's situation given the harmonious coexistence of both land sectors, and the extent of collaboration between them. It is however dependent on the implementation and enforcement of the SW Strategy, which suggests an independent team to oversee such collaborative activity areas. The combined knowledge and expertise of the team can support acquisition and transfer of land data off-chain and onto the blockchain system successfully. These data can then be distributed amongst all actors including the lands commission, town and country planning department, customary/private lands owners, financial institutions that grant finance for land transactions, and also real-estate agencies. The relevant actors to a particular transaction will then review and validate the data through an inbuilt consensus mechanism in the blockchain system, see [20]. The validated and reliable data become available in the blockchain system.

Finally, the application programming interface (API) integration for platform users, developers, and third-party service providers also provides sound basis for how our proposed blockchain land acquisition system can be designed. As there are many parties involved in land transactions, including financial institutions, real-estate agencies, among others, the system must be designed in such a way to integrate all of them. These actors must be able to have access to the system and be abreast with all transactions that concern them. After developing such an integrated interface application, prospective land purchasers can then access the data and purchase land after successfully creating a user profile account on the blockchain application system. In this way, a prospective land purchaser will only log into the blockchain system using their user accounts, assess all the relevant information on the land, and make a decision whether or not to purchase the land without going through the stress and hassle identified under the current processes as presented in Section 5. Upon purchasing and a successful payment of the land value, all necessary changes will then be effected and validated in full awareness of all relevant actors to the transaction. Documents can then be transferred to the blockchain account of the purchaser, as well as shared with all other actors like financial institutions where necessary. The picking up of original hard-copy documents can be arranged between the executors. This system can help eliminate any possibility of double sale as a purported second sale will be identified in the system. There will be no avenue for unofficial charges as all work processes are under scrutiny of all the involved actors and any unnecessary and deliberate delay will be identified. In addition, all overlaps and unnecessary bureaucracies will be discarded as all steps are programmed, and finally, as the acquisition process occurs largely online, the interruption of middlemen will be eliminated. Land records will also now have security and can be trusted as well, as any unauthorized change will be identified and corrected by all the stakeholders. Registration of the land can follow using the same blockchain platform. See [20] for the proposed blockchain-based land registration process.

6.2. The Proposed Blockchain-Based Land Acquisition Framework

Figure 5 below shows our proposed blockchain-based smart land acquisition framework.

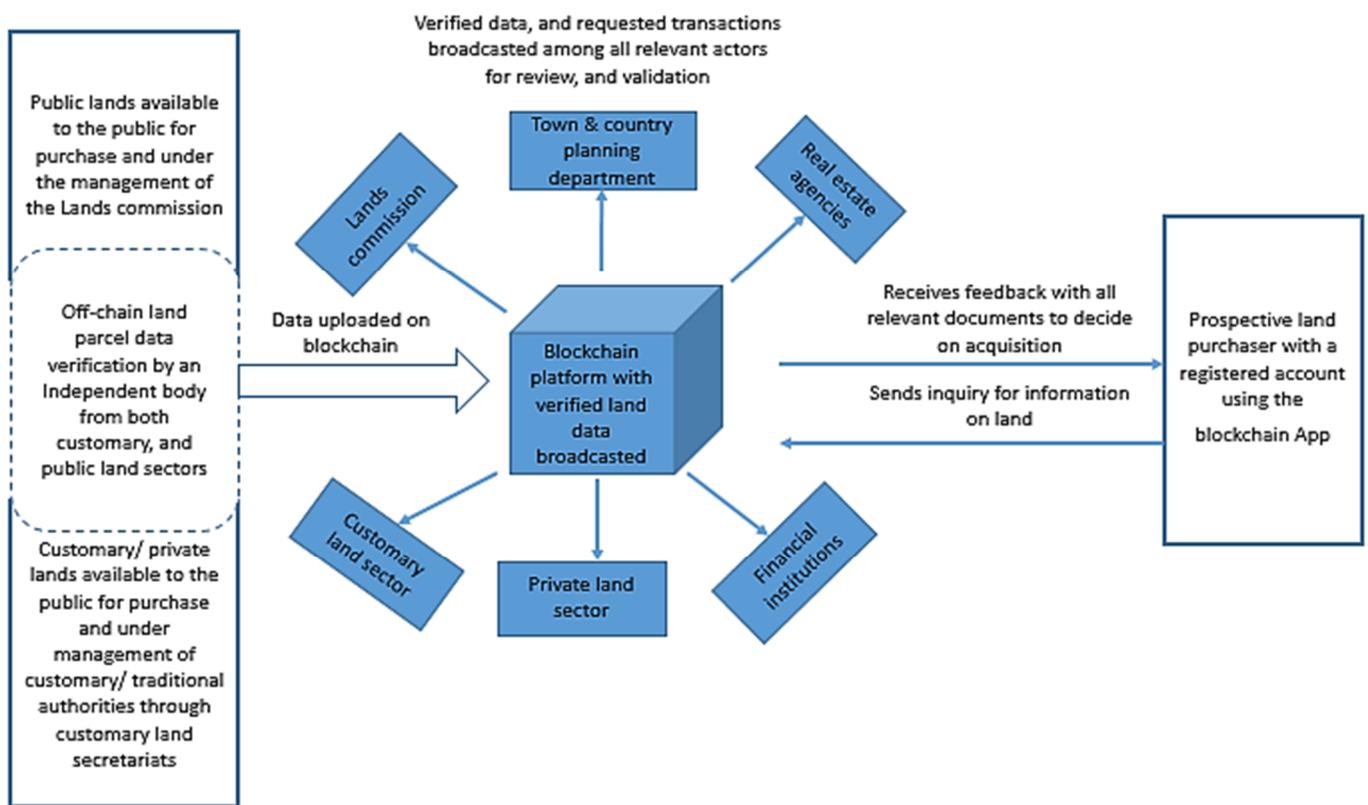


Figure 5. Blockchain-based smart land acquisition framework. Source: Authors' construct.

This proposed framework will disrupt and replace the already existing processes in certain ways as is in accordance with smart technologies [26]. The main disruptions will include the elimination of intermediaries in land information accessibility and elimination of unofficial charges. The incurring of cost that could become a loss to the prospective purchaser if a search result turns out negative will also be eliminated. Finally, the unnecessary bureaucracies due to the overlap and repetition of functions will be eliminated to shorten and simplify the existing cumbersome land acquisition process.

7. Conclusions

This study has drawn on the new concept of smart land management, specifically, blockchain's application to land management. Through a SWOT analysis and deductive insights from a digital land registry concept, the study sought to identify how blockchain as a smart technology could be employed to enhance land acquisition in a pluralistic land management system fraught with countless challenges. It supports the epistemology that the machinery with regard to land transactions that is clear, understandable, fair, and reasonable in its operation and implementation, and supported by a computerized system to provide quicker accessibility to updated land data, is a necessity for effective land management and land administration processes [70]. The study demonstrates that bridging the extreme ends of customary and public land acquisitions through a blockchain-enabled system is possible.

The main contribution of this study to knowledge in the topic area is that it has conceptualized a new smart blockchain-based land acquisition framework, Figure 4. This framework and its underlying concept are relevant for addressing land acquisition challenges not only in Ghana but in the many other developing countries especially in the sub-Saharan Africa that have similar dual land-tenure systems and land acquisition challenges. The framework will permit accessibility to land information devoid of intermediaries and eliminate unnecessary bureaucracies and unqualified middlemen to shorten and simplify land acquisition processes. It again eliminates unofficial charges from the process. This

makes the framework useful in the context of other African regions like Rwanda, Kenya, Nigeria, and Uganda [12,84–86].

It is essential to mention that threats of system sabotage from some corrupt land officials, and customary authorities who might not wish for transparency in their deals, exist. In addition, the private blockchain-based land companies could equally undermine the system for fear that it will eventually kick them out of the land market. Additionally, the eliminated middlemen will try to find alternative approaches to intercept the system. To forestall these threats, we recommend: Initial consensus with customary authorities to get them to understand, accept, and pledge their support for the framework. Provide legal basis for PPP to assure private blockchain experts of a continuous stay in the land market. Again, government should collaborate with customary authorities to absorb most of the graduates in the land discipline that have turned into middlemen due to lack of employment. Finally, legal sanctions should be strictly enforced against any illegal land activities identified and which threatens the system. Other policy implications including expansion of land records digitization in a participatory approach, and public education on the use and how the blockchain system works among others, as identified in [20], are relevant in this study's context.

This study was limited by the scarce literature on both smart land management and blockchain's application to land management, particularly relating to contexts of a pluralistic land tenure system such as that found in Ghana. This limitation is also partly due to the fact that this study is the first to specifically look at the possibility of blockchain's application for both customary and public land acquisition in a simultaneous manner in the Ghanaian context. More research works in this topic area are therefore encouraged. Specifically, considering that the concept of blockchain application to land management is still elementary and continues to evolve, the study recommends that future research works should look into establishing a framework that can be used as a guide to assess the readiness of land management and land administration systems in sub-Saharan Africa for blockchain consideration especially in Ghana.

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