

**An Explorative Case Study of Blockchain as a Means to Enhancing Land Registry
Governance to Uphold Property and Land Restitution in South Africa**

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By

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PLAGIARISM DECLARATION

I, **Tom Tshitangano**, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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ABSTRACT

Land ownership is one of the fundamental constitutional rights of every citizen in South Africa. The slow progress regarding land reform and security of tenure in the form of the transfer and registration of title deeds is arguably a failure of the State to uphold the Constitution of the Republic of South Africa. Section 25 (5) of the Constitution requires the state to take measures to foster conditions which enable equitable access to land and to take reasonable legislative and other measures, within its available resources, to foster conditions which enable citizens to gain access to land on an equitable basis. Governance inefficiencies in the current land registry, specifically in relation to title deeds associated with land restitution and social housing — including acts such as corruption and fraud — hinder the progress of the constitutional requirement to reform land ownership.

Such inefficiencies include the current centralisation of the Deeds Office; an incomplete land registry with a backlog of title deeds; insecure tenure for the majority of properties on communal land and in informal settlements; the inaccessibility of the land registry for the majority of the population; the high costs attached to purchasing property, accessing the land registry, conveyancing fees, deeds transfers and title deeds; processing delays caused by the current paper-based, manually driven land registry processes; and unreliable land audit reports.

The Institutional Analysis and Development (IAD) framework — together with public goods, principal-agent and collective action theory — form the core elements of the conceptual framework which is evident in the registration of titles for purposes of land reform in South Africa. This framework is used to analyse the existing institutional arrangements, the factors undermining the effectiveness of the land registry, and potential governance solutions and technological safeguards.

Alongside interviews with key experts, the analysis of the available secondary empirical evidence, the legal, regulatory and grey document and media coverage, following the coding of the data and- triangulation of findings provide a detailed context for the case study and evidence base for the limited but significant role blockchain could play in enabling more effective administration and governance of the land registration, particularly at the points that it is most vulnerable to abuse and which impacts on those least able to protect their interests.

From the analysis, it is proposed that the identified resource constraints and lack of institutional capacity to implement a blockchain solution could be overcome through carefully managed public-private interplays. To fulfil its primary purpose, the registry needs to be complete, accurate, secure, and accessible to anyone wishing to register title deeds.

This thesis examines whether the registry does fulfil these requirements currently. The findings from a set of high-level, in-depth interviews with experts in the field reveal that, while the registry system works relatively effectively for the high-end of the market, in the lower-end of the market where most of the land and housing reform transfers take place, there is evidence of inefficiencies including, inter alia, fraud.

It finds that under particular complementary conditions, blockchain could provide a decentralised and secure land registry that could transform the Deeds Office and modernise land reform and restitution to address governance inefficiencies and aberrations, particularly in relation to corruption and fraud.

This thesis makes the case for blockchain technology being deployed to enable the land registry in South Africa to fulfil its functions as a public good critical to the implementation of the Electronic Deeds Registration Systems Act of 2019. In doing so, it will be able to better serve its critical role in the constitutional requirements of land restitution and housing provision.

Keywords: land registry, land reform, corruption, fraud, public good, decentralisation, technology innovation, blockchain, public-private interplays, digital transformation, effective governance

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LIST OF ABBREVIATIONS

ANC	African National Congress
API	Application Programming Interface
BASA	Banking Association of South Africa
CAHF	Centre for Affordable Housing Finance in Africa
CEO	Chief Executive Officer
CIPC	Companies and Intellectual Property Commission
CoCT	City of Cape Town

CoJ	City of Johannesburg
CPA	Communal Property Association
CPI	Corruption Perception Index
DA	Democratic Alliance
dApps	Decentralised applications
DAO	Decentralised Autonomous Organisation
DALLRD	Department of Agriculture, Rural Development and Land Reform
DEL	Department of Employment and Labour
DHA	Department of Home Affairs
DHS	Department of Human Settlements
DLT	Distributed Ledger Technology
DRA	Deeds Registries Act 47 of 1937
DRS	Deeds Registration System
DTIC	Department of Trade, Industry and Competition
DoJ&CD	Department of Justice and Constitutional Development
DX	Digital transformation
ECTA	Electronic Communications and Transactions Act 25 of 2002

EDRS	Electronic Deeds Registration System
EDRSA	Electronic Deeds Registration System Act 19 of 2019
FAO	Food and Agriculture Organization
FICA	Financial Intelligence Centre Act of 2001
GDP	Gross Domestic Product
GPS	Global positioning system
HSS	Housing Subsidy System
IAD	Institutional Analysis and Development Framework
IBM	International Business Machines
ICT	Information, Communication and Technology
ID	Identity document
IDRC	International Development Research Center
IFC	International Finance Corporation
IRBA	Independent Regulatory Body of Auditors
ITB	Ingonyama Trust Board
LSSA	Law Society of South Africa
MHC	Master of the High Court

NPA	National Prosecuting Authority
NPC	National Planning Commission
OECD	Organisation for Economic Cooperation and Development
PAIA	Promotion of Access to Personal Information Act 2 of 2000
POPIA	Protection of Personal Information Act of 2013
PPP	Public-private partnerships
PPI	Public-private interplays
PPRA	Property Practitioners Regulatory Authority
PwC	PricewaterhouseCoopers
RDP	Reconstruction and Development Programme
SAPS	South African Police Service
SARS	South African Revenue Service
SIU	Special Investigation Unit
SMMEs	Small, Medium and Micro Enterprises
TI	Transparency International
UN	United Nations
UNECE	United Nations Economic Commission for Europe

UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNDP	United Nations Development Programme
UNODC	United Nations Office on Drugs and Crime
UIF	Unemployment Insurance Fund
VAT	Value-Added Tax

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grandfather's final wish was that his grandchildren would be educated. This is for you, grandpa.
Rest in power, I love you.

CHAPTER 1: INTRODUCTION

1.1 Research Topic Overview

This thesis is “An explorative case study of blockchain as a means to enhancing land registry governance in support of property and land restitution in South Africa”. The research topic delves into the current land registry governance inefficiencies, issues and challenges and their negative impact on the public good of the land registry as well as land reform and property and land restitution in general.

It also explores the capabilities of blockchain technology and investigates whether they can address some of these inefficiencies and bring about a more effective property management and land restitution system in South Africa.

1.2 Research Context and Background

There have been various land reform policies and programmes in South Africa since the first post-apartheid democratic dispensation in 1994. These include general land tenure reform, the Reconstruction and Development Programme (RDP), the National Development Plan (NDP) Vision 2030, and the current draft of the Expropriation Bill (B23-2020). The first government white paper on reconstruction and development was published in 1994 and the RDP was one of its first land reform pilot programmes. The aim of the land reform pilots was to develop and support integrated, sustainable rural development and rural local government models through land restitution and redistribution, tenure reform and settlement support to kick-start a wider land reform process (Government of the Republic of South Africa, 1994). The objectives of land tenure reform included enabling all citizens to register a title deed as a form of ownership so that they could sell their land or home at any time, allowing groups of people to own land or property through a communal property association (CPA), and giving people (especially farm

workers and labour tenants) security of tenure over the houses and land where they resided or worked.

These reform objectives are yet to be fully achieved or realised. However, the more modern NDP states that land reform would unlock the potential for a dynamic, growing and job-creating agricultural sector (NPC, 2011). Additionally, another stated objective of South African land reform was to redistribute 30% of white-owned agricultural land to black farmers to create jobs and eradicate poverty, though this has not yet been achieved (Education and Training Unit, no date). The South African government is committed on paper to the acceleration of the land redistribution programme to redress the historical injustices of land dispossession and displacement. This would make available more land for cultivation for food security, rural development, and poverty reduction, and simultaneously address the issues of equitable spatial planning and settlement (DRDLR, 2020). According to the Centre for Affordable Housing Finance in Africa (CAHF), the government has built over three million RDP houses since 1994, but an analysis of Deeds Office data indicates that only 1,9 million of these properties have been registered (71point4, 2019). Furthermore, “a central component of land inequality is the lack of security of tenure, economically excluding the majority of South Africans, particularly women and youth in both rural and urban areas. By mid-2018, over 60% of citizens' land and property rights remained unrecorded or unregistered” (Presidential Advisory Panel on Land Reform and Agriculture (2018).

Corruption, fraud, and land registry inefficiencies also contribute to the poor outcomes of land reform and the slow progress of land restitution in South Africa. Property owners who are most vulnerable to fraud are those whose identity has been stolen, those who rent out their properties, those who live overseas, those whose property stands empty for long periods (e.g. holiday-home owners), elderly people who have moved into care facilities, personal representatives of deceased registered proprietors, those in family disputes or break-ups, those whose property is not mortgaged, and those whose property is not registered (Elkins, 2015). Land reform

beneficiaries are also not immune to corruption and fraud. Their identities may be stolen, some of their properties may not be put up for mortgages (e.g. subsidised housing), they lack the security measures of bonded properties owned by the banks, some beneficiaries may have passed on resulting in family disputes, and some of these properties may not be registered.

The United Nations (2019) has indicated that much of the world's land and property is undocumented and, in some countries, particularly where governments are weakest, the data is vulnerable to alteration. Over 25 years into democratic rule in South Africa, there is still no accurate and complete information regarding who owns which land (Advisory Panel on Land Reform and Agriculture, 2019). Due to the current centralisation of the Deeds Office and complete reliance on conveyancers, the land registry lacks the necessary transparency to enable detection and prevention of corruption. Many property owners in South Africa are also vulnerable to fraud which may be enabled by the current land registry inefficiencies such as long processing delays, absence of certain title deeds, title deeds backlogs, and manual, paper-based processes. Deeds Office processes are also prone to manipulation and very often cause delays, have negative impacts on property and land restitution, and potentially create opportunities for corruption and fraud. The problem is exacerbated by the current backlog of title deeds in the government-subsidised RDP housing market and the absence of individual title deeds for properties in communal land and informal settlements.

Because real estate has always been the most extensive product of human creative activity, as well as the most obvious form of material value, it may be considered of great social, economic and political importance in each country (Sladic et al., 2021). Moreover, land and built properties represent a large portion of national wealth and, therefore, it has been necessary for each country to establish various registers for land and built properties from the earliest times of human development (Sladic et al., 2021). Land ownership is a fundamental constitutional right of every citizen in South Africa. Moreover, land as an asset serves as the backbone of any well-functioning digital economy and has the potential to assist the government to deal with

socio-economic challenges such as unemployment, inequality, and poverty. Security and reliability are considered two of the most important characteristics of land records and various techniques have been applied to achieve this throughout history (Sladic et al., 2021). In order for the government to properly measure, monitor and manage its land reform programme and could potentially be able to detect and prevent some of the corruption and fraud currently endemic to the system, an inclusive, transparent, secured, accessible, auditable, reliable, and complete land registry is required.

1.3 Land Registry - Institutional Arrangements in South Africa

The land registry is at the core of the governance processes within the land and real estate sector. The current institutional arrangements, as shown in Figure 1-1 and Figure 1-2 (below), are reflected in interplay and power relations between the state represented by the Department of Agriculture, Land Reform and Rural Development (DALRRD) and the Deeds Office, the specialised agency responsible for the land registry; the market with its key stakeholders such as estate agents, conveyancers, surveyors, banks; third-party land registry commercial service providers that currently integrate with the land registry and render data and information services; and citizens in the form of buyers, sellers and land owners, whose properties are registered as title deeds.

Other state institutions that the Deeds Office depends on for the functioning of the land registry include the South African Revenue Services (SARS), who verify if taxes have been paid; the Department of Trade Industry and Competition (DTIC) and the Companies and Intellectual Property Commission (CIPC) which verify the legitimacy of companies in cases of companies purchasing land or properties; the Office of the Valuer which confirms valuations of state-owned land and properties; the Master of the High Court (MHC) which falls under the Department of Justice and Constitutional Development (DoJ&CD) which assists with verifications of various court orders or court settlement orders that affect deeds transfers; and

the Department of Home Affairs (DHA) which verifies the ID numbers of buyers and sellers, marriage certificates and wills or testaments. Other key political institutions that regularly interact with land reform programmes and interface with the land registry (reflected on Figure 1-2) include the national, provincial and local arms of the Department of Human Settlements (DHS), which work together on key programmes such as subsidies for affordable housing.

Moreover, various local municipalities (e.g. the City of Johannesburg (CoJ) and City of Cape Town (CoCT)) assist with municipal rates and taxes clearance certificates obtained by estate agents and conveyancers prior to submissions to the Deeds Office as part of the deeds transfer lodgement process. The national Department of Employment and Labour (DEL) assists with the verification and confirmation of whether beneficiaries of subsidised affordable housing are employed, contribute towards the Unemployment Insurance Fund (UIF) or have a PERSAL number if they are claiming to be government employees.

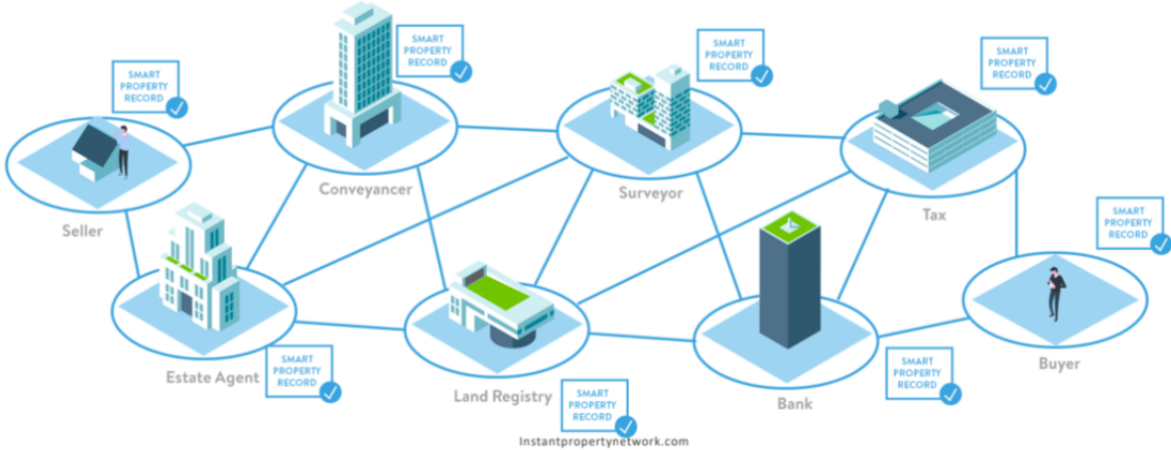


Figure 1-1: Land Registry Institutional Arrangements (Source: Adapted by author from John Dean Markunas, The Impact of Blockchain Technology on the Surveying Industry, Cadastre and Land Registry Systems, 2019)

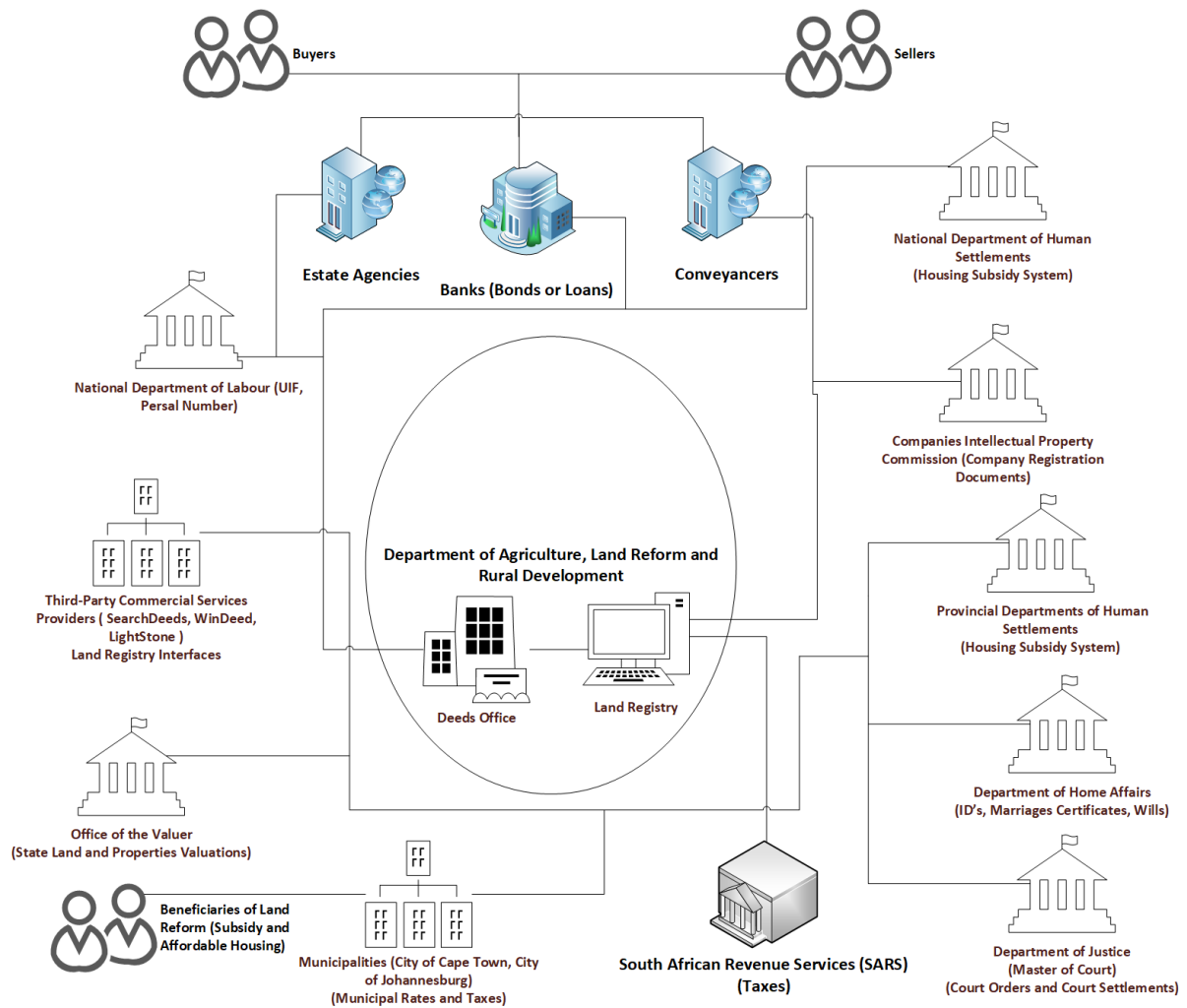


Figure 1-2: Land Registry Institutional Arrangements (Source: Author’s own compilation)

The land registry’s main function, which is to record land and property ownership rights, is fundamental to the overall wellbeing of the land and real estate sector, but also as a foundational asset base of the broader economy and indeed the underlying constitutional rights governing property.

The accurate and secure registration of title deeds is also vital for the acceleration of land reform programmes through land tenure reform. The real estate sector, which includes the residential market, commercial market and agricultural market segments, plays a significant role within the South African economy. Key stakeholders in the sector include sellers, buyers, estate agents, conveyancers, surveyors, banks, tax authorities, municipalities, and the land registry itself. To manage the uneven power relations between these parties and their uneven ability to exercise their interests, land governance more generally and the land registry specifically needs to be transparent, secure, accessible, reliable, and auditable.

According to CAHF, “as of the end of 2019, South Africa had 6,6 million formally registered residential properties on the Deeds Registry”. Moreover, “Government delivery of affordable housing in the past two and half decades has had a profound effect on the residential property market, and housing programmes play a substantial role in the provision of new housing stock at the lower end of the market (CAHF, 2020). In 2019, 31% (2,04 million properties) of all residential properties were financed by the government and 67% of properties valued under R300 000 were government-subsidised properties. Lightstone (2019) also calculated that “of the 8-million registered properties in South Africa, 83% are residential and these 6.7-million homes have a combined value of R5.4 trillion, with Gauteng accounting for some R2-trillion of this figure. Of the total, 67% are freehold properties, 18.3% are in estates and 14.2% are sectional title units.” However, despite the growth of the real estate sector, driven predominantly by the government’s housing programmes, some of the corruption and fraud issues identified through the desktop research for this thesis exposed several current land governance inefficiencies.

Since 1994, the African National Congress (ANC) government has been pursuing land reform programmes with three key prongs: the restitution of land to the dispossessed, the redistribution of 30% of commercial farming land to black South Africans, and the granting of secure title to land to citizens who currently lack it. Progress has been slow. Production has collapsed on at

least 70% of restored land and on as much as 90% of transferred land (SAIRR, 2018). Despite government efforts post-1994 to ensure equitable distribution of land in South Africa through land reform, corruption and fraud are prevalent and exacerbated by land registry governance inefficiencies such as lack of title deeds and security of tenure for low value properties. This research study focuses on the land administration and management processes of the Deeds Office as the current sole custodian of the land registry, with a fragmented Deeds Registration System (DRS) in each province. The study investigates whether further digitalisation and transformation of the Deeds Office through blockchain could support the decentralisation of the land registry and facilitate the automation of all key processes such as sale agreements or offers to purchase. It investigates whether the digital integration of the land registry and all key stakeholders could assist in dealing with some of the corruption and fraud issues within the real estate sector and enable the government to accelerate the implementation of the land reform programme. The study looks beyond merely digitising the current form of the land registry, which would create some efficiencies, but also at whether technologies such as blockchain could be leveraged to address the current land registry inefficiencies and support land reform.. Blockchain is a decentralised ledger that sequentially records transactions or interactions among users within a distributed network. In simpler terms, a blockchain can be defined as a public spreadsheet that sequentially records transactions among users operating within a decentralised peer-to-peer network (IDRC, 2017). This thesis investigates whether blockchain technology can be used to provide controls to assist in dealing with current land registry inefficiencies and transform the land registry into a mission-critical data resource and an effective and efficient public good supporting land reform.

In the context of the current land reform governance challenges, and specifically land registry inefficiencies and how they can potentially enable corruption and fraud, this thesis investigates how blockchain technology could be deployed to create an inclusive, complete, decentralised, reliable, secured, transparent and auditable land registry in the Deeds Office.

Drawing on the experience of countries engaged in blockchain technology innovation, the study also assesses and reviews the current Deeds Office mandate and the centralised land registry in South Africa against a decentralised public land registry. It examines whether greater private sector participation in the delivery of the digitalised land registry would better be able to address the current land registry inefficiencies. It also explores whether this would extend accessibility to all the citizens and assist the government to better manage land reform programme implementation with specific reference to the development of an accessible, affordable, and secure land registry in South Africa.

1.4 Problem Statement

The South African land and real estate sector, especially with regards to land reform and RDP housing programmes, is faced with a number of governance inefficiencies including corruption and fraud, as documented below. The state should be providing affordable, transactable and corruption-proof access to land ownership for all citizens, while recognising that the land rights of between 60-70% of all South Africans currently remains off-register (de Satge and Cousins, 2019). Part of the problem is the current governance inefficiencies undermine the integrity of the land registry and property and land restitution for South Africans.

The current land registry governance inefficiencies include:

- an inaccessible land registry for the majority of the citizens
- high land and property purchasing costs;
- elements of corruption and fraud;
- high Deeds Office fees to access the land registry
- an incomplete land registry
- a backlog in title deeds for some subsidised houses

- the lack of security of tenure for properties within communal lands and informal settlements
- the lack of security of tenure and title deeds for the land allocated to commercial black farmers as part of land redistribution programmes
- paper-based and manual processes in the Deeds Office
- long processing delays in registrations and transfers of title deeds

According to Transparency International (TI), “around 80% of African people live on less than US\$2 a day with corruption as one factor perpetuating poverty” (Transparency International, no date). Moreover, only 1% of land in sub-Saharan Africa is mapped adequately on a land registry, making the land sector wide-open for corruption (Thomson Reuters, 2018). Thomson Reuters (2016) calculated that many sub-Saharan African countries have lost revenue from the untaxed profits of multinational corporations, especially in land speculation and land-based extractive industries, amounting to almost 10% of their GDP, a factor which hinders their economies significantly. Corruption and fraud have been identified as two of the root causes of the South African government's slow progress in land reform and redressing the past injustices around equitable land ownership. South Africa has also been trying to deal with the challenges of low economic growth, growing inequality, high unemployment and poverty, all of which are often exacerbated by corruption and fraud. PricewaterhouseCoopers’ (PwC) Global Economic Crime and Fraud Survey 2020 ranks South Africa third in terms of countries reporting the most economic crimes and bribery, with corruption accounting for 42% of reported crimes. In South Africa, there are several cases and allegations of corruption and fraud around land reform, some of which are documented below (IoL, 2021). There are also land governance inefficiencies around processing land ownership and providing security of tenure involving the registration of property rights in a form of title deeds.

In South Africa, corruption and fraud within the real estate sector are also enabled by the problems with the land registry. Moreover, the lack of proper governance also contributes to

poor and unreliable land audits that hinder the government's ability to measure the progress of land reform outcomes since 1994. Currently, most South African citizens do not have title deeds for their properties and cannot easily access their property ownership information from the current land registry due to the costs of fees at the Deeds Office. In addition, citizens pay hefty tax duties on transfers and high bond attorney and conveyancing fees that further incentivise bribery and informal property trading.

Corruption and fraud in this space is a result of significant discretionary powers, a general lack of transparency and the prevalence of complex and cumbersome administrative procedures involving multiple steps and multiple agencies. These are most notable in the registration and allocation of land rights, in the approval of land-use plans and the issue of building permits and in the provision of land information (Koechlin, Quan and Mulukutla, 2016). Bennett et al. (2021) argue that, despite the best efforts of both deeds and registration systems, fraud is still possible and certainly occurs; this can be actioned by buyers, sellers, other actors, or even the registry officials themselves. The systems and controls have loopholes relating to instruments, documents, and processes, all vulnerable to exploitation.

With many subsidised properties or RDP houses still not registered, and multiple informal settlements without security of tenure, there are still many loopholes within the land administration and management processes that pose a risk for further corruption and fraud opportunities. which will continue to undermine government land reform programme objectives. It currently takes 7-8 working days for registration in the Deeds Office (MyDeedSearch, no date).

Corruption and fraud are also related to the centralised nature of the land registry authorities. The lack of transparency 'allows' bureaucrats to change the ownership of a piece of land. Many countries have only oral agreements and no title deeds, which make fraud easier (Themistocleous, 2018). There are currently some challenges and limitations around the Deeds

Office that need to be resolved for the land registry to become a more resilient public good in the fight against corruption and fraud, and to support land reform.

These land registry governance inefficiencies provide inadequate levels of transparency, accessibility, security, auditability, reliability, and accountability and as a result, enable corruption and fraud. These sentiments were also captured by the Urban LandMark Report in 2011. This report stated that at least two stakeholders questioned the value of the centralised nature of the deeds registration system in South Africa, one arguing that the centralisation of the system is problematic and unnecessary and estimated that 99% of transactions are simply “A-to-B”, the responsibility for which could be devolved to municipalities (Urban LandMark Report, 2019).

The Urban LandMark Report (2019) further argued that, according to the Electronic Deeds Registration Systems Act of 2019 (EDRSA), the Chief Registrar of Deeds must, subject to the Electronic Communications and Transactions Act of 2000 (ECTA), develop, establish, and maintain the electronic deeds registration system using information and communications technologies for the preparation, lodgement, registration, execution and storing of deeds and documents.

This raises a few questions. Can the Deeds Office further automate its manual and paper-based business processes to achieve the necessary efficiencies required by using blockchain technology? Furthermore, by going online, will the Deeds Office facilitate easier access to the land registry for all the citizens who are the beneficiaries of subsidised housing? Finally, will this change assist in dealing with corruption and fraud?

Central to this thesis is to assess the degree to which blockchain is able to address the governance challenges currently faced by the Land Registry and Deeds Office to strengthen property and land restitution in South Africa by enhancing transparency, accessibility,

auditability, security, reliability, and accountability in combating while supporting. This thesis also seeks to investigate whether the implementation of the proposed EDRSA using the blockchain technology could bring greater transparency, accessibility, auditability, security, reliability, and accountability to address land registry governance inefficiencies, counter corruption and fraud, and support land reform in South Africa.

The land reform policy is currently driven and implemented by municipalities. They thus need to be empowered with a system that makes it easier to facilitate property transfers currently done by the Deeds Office only. With the current backlog in title deeds and an incomplete land registry in South Africa, corruption and fraud are bound to continue and, as a result, government land reform objectives may not be realised. It is not possible from the data in the public domain to determine the extent to which land redistribution is targeting poor households or contributing to poverty reduction (Kepe and Hall, 2016). Furthermore, without a complete, inclusive, transparent, secure, reliable, and auditable land registry, the government will not be able to deal with corruption and fraud within the real estate and land sectors and this will continue to negatively affect the implementation of the constitutional and political imperatives of successful land reform.

1.5 Purpose of the Research

The purpose of this research is to investigate whether blockchain technology innovation could be adopted for an inclusive, complete, and decentralised land registry through public-private interplays (PPIs) to enhance transparency, accessibility, auditability, security, reliability, and accountability. The research starts with an investigation into current land governance (land administration and management) and land registry governance inefficiencies, and their impact on land reform, corruption, and fraud. An examination of land information involves considering issues around the completeness of the registry, the reliability of records, cost-effectiveness, sustainability, and transparency (Urban Landmark, 2013). 71Point4 (2020) has argued that the

good news is that property transfers in South Africa are already on track to becoming partially digitised. This presents the government through the Deeds Office with an opportunity to consider blockchain as a technology of choice for the digitisation of the land registry in South Africa due to its potential benefits such as cost-effectiveness, transparency, accessibility, auditability, security, and reliability. Furthermore, on 3 October 2019, the long-awaited EDRSA was passed into law (Nyongo, 2019). The EDRSA states that the “Chief Registrar of Deeds” must, subject to the ECTA, develop, establish, and maintain the electronic deeds registration system using information and communications technologies for the preparation, lodgement, registration, execution and storing of deeds and documents (Government of the Republic of South Africa, 2019).

While this is a move in the right direction, industry professionals remain sceptical as to when the electronic deeds registration system will be implemented and how critical aspects such as the safety, security and integrity of the data will be ensured (Robey, 2020). Robey (2020) further argued that the digitisation of the Deeds Office is only one component of the property transfer process. Other steps, including the signing of a sale agreement, would also need to be digitised for buyers and sellers to reap the time and cost benefits digital processes could provide. This research critically assesses and reviews the current land registry policies, legislatures, regulations, systems, processes, and technologies, and investigates how blockchain could enhance and improve transparency, security, accessibility, reliability, auditability, and accountability beyond the digitisation of the paper-based deeds transfers and title deeds currently underway as part of the EDRSA implementation by the Deeds Office.

With the advent of the internet, e-commerce and computerisation, there has been an increased need for electronic service delivery. From a deeds registration point of view, modern methods will accommodate the anticipated increase in registration volumes flowing from the government’s land reform initiatives, and enable the decentralisation of Deeds Office services (Botha, 2020). Given the current Deeds Office’s sole mandate is to manage the centralised land

registry in South Africa,, this research investigates whether blockchain technology innovation could be adopted to build a decentralised land registry that potentially could be managed and monitored by multiple stakeholders through PPIs.

1.6 Research Questions and Scope

The scope of this research study focuses on understanding the land governance processes of the Deeds Office and the land registry, identifying any inefficiencies associated with title deeds transfers and registration and the potential for enhancement or improvement of these governance processes through blockchain technology innovation. This research focuses only on the land captured by the land registry. It spotlights the impact of current land governance inefficiencies on land reform, as the evidence suggests that this is where fraud and corruption hit hardest. These inefficiencies at the centre of the land registry include the current manual and paper-based processes, title deeds backlogs, lack of access to the land registry by the much of the population, reliance on conveyancers to lodge deeds transfers, limited access to conveyancers by all citizens, high fees for Deeds Office and land registry services, and processing delays in deeds registration.

Because the land registry encompasses ownership rights in the form of title deeds, the scope of the research study focuses only on the land tenure reform component of land reform. Even more specifically, the research focuses on land tenure reform in terms of securing ownership rights of citizens through the title deeds registration process currently affected by land governance inefficiencies, corruption, and fraud. This includes the RDP subsidised-housing programme, currently negatively affected by the title deeds backlog, and properties within communal land and informal settlements, currently affected by insecurity of tenure and lack of title deeds. While providing broader context, this research does not deal with the entire land reform policy but focuses on how the land registry could support land reform from a land restitution and

property rights ownership perspective. The research does not cover other land reform areas such as land claims which fall outside the mandate of the Deeds Office and the land registry.

For the same reason, the scope of this investigation extends into land registry governance inefficiencies such as corruption and fraud within the land and real estate sector. This study focuses on the challenges of real estate sector land administration, management and governance caused by the current inefficiencies in the Deeds Office and land registry. At the core of this research study is a review of the Deeds Office mandate, and of key stakeholders, laws, policies, regulations, systems, processes, and technologies that govern the land registry. Arising from the scope of this research and the problem statement are the research questions identified below:

1.6.1 Main Research Question

What impact could the adoption of blockchain technology have on the enhancement of good governance within South Africa's land registry?

1.6.2 Research Study Sub-Questions

1. How could blockchain contribute to building an efficient property management regime and, in turn, good governance?
2. Can blockchain limit opportunities for fraud and corruption and increase efficiency by enabling transparency, accessibility, auditability, security, reliability, and accountability for the land registry, particularly in relation to land reform title deeds registration?
3. What are the required policies and regulations for an inclusive, complete, transparent, accessible, auditable, secure, reliable, decentralised land registry that would provide a

trusted alternative to the current centralised land registry to support land reform, property, and land restitution?

4. What are the obstacles and technical concerns that could prevent the adoption of blockchain technology?
5. What are the necessary foundational conditions, such as infrastructure, security, human development, or skills development, required for the successful adoption of a blockchain-based land registry?
6. How could a decentralised blockchain land registry using PPIs provide the necessary resources and skills to facilitate innovation within the Deeds Office; deliver an inclusive, complete, secured, decentralised blockchain land registry; support land reform, property and land restitution; and assist in dealing with corruption and fraud?
7. How could a decentralised blockchain land registry enhance property and land restitution, reduce corruption and fraud by increasing access, title deeds registration and by securing the rights of land reform beneficiaries? How could this assist the government to monitor and manage the land reform programme effectively and efficiently?

1.7 Overall Structure of the Thesis

Chapter One has discussed the objectives of land reform in South Africa, the role of the land registry, current land governance inefficiencies and their impact on the land registry, how these inefficiencies enable corruption and fraud, and the impact of corruption and fraud on land reform. Although the Deeds Office is currently implementing the EDRSA to improve efficiency, starting with the conversion of the existing title deeds into electronic deeds through a microfilming process, this chapter raised the question of whether there is still room for further transformation of the Deeds Office through technological innovation. Specifically, it asked if blockchain technology applied to the land registry could make it more inclusive, transparent,

accessible, auditable, secure, and reliable. The premise is that this could promote better accountability, resilience against the corruption and fraud issues identified in this chapter and to strengthen property and land restitution.

Chapter Two reviews the literature that can assist with addressing the current land registry governance inefficiencies such as poor governance, land reform, corruption and fraud, lacks in transparency and accountability, limited innovation within the public sector and around the land registry and high levels of centralisation. The literature review highlights some of the effective governance principles in providing guidelines to public sector organisations responsible for land reform and management and monitoring of the land registry. The review also highlights the need for transparency and accountability for effective governance of land reform and in dealing with corruption and fraud. The literature pinpoints the objectives of land reform and its beneficiaries in South Africa. Other literature highlights the forms of corruption and fraud, which are the main governance issues around the land registry, their root causes, the involvement of stakeholders such as government officials in corruption and fraud, and other inefficiencies within the land and real estate sector and the land registry that enable corruption and fraud.

This chapter reviews and highlights the capabilities of blockchain technology to support land reform, property and land restitution and in building anti-corruption and anti-fraud controls. This chapter reviews the literature on blockchain land registry pilots to assess how they may address land registry governance inefficiencies and particularly to assist in dealing with corruption and fraud. The review ends with the literature assessing how blockchain technology could enable decentralisation and increase transparency, accessibility, auditability, security, reliability, and accountability.

Chapter Three introduces the conceptual framework for addressing the research questions identified for the study. The conceptual framework draws on institutional analysis to investigate

the relevant key role players, their power and their interests, policies, regulations, laws, processes, systems, and technologies that govern the land registry as part of land governance. The framework also adopts the concept of ‘public good’ to critically review the current land registry against certain public good characteristics, particularly non-excludability and non-rivalry. It is these that enable positive governance with features such as inclusiveness, completeness, transparency, accessibility, auditability, security, reliability, and accountability. Ensuring the land registry operates as a public good should support land reform and deal with corruption and fraud for the benefit of the majority, who are the beneficiaries of the land reform programme. This thesis also adopts the concepts of principal-agent and collective action to understand the root causes and enablers of corruption and fraud, as well the involvement of stakeholders involved. The conceptual framework further uses the concepts of decentralisation, PPIs, technology innovation and digital transformation as lenses to view the implementation and the adoption of blockchain for the land registry use case. The overall implementation is intended to achieve more effective governance of the land registry in support of land reform.

Chapter Four outlines the methodology selected to gather evidence, i.e. primarily qualitative research starting with document analysis and then expert interviews with key stakeholders selected through snowball sampling after the initial identification of departments, agencies, and individuals. The chapter highlights how interviews were conducted, how interviews were transcribed, how transcribed data was coded, and how the relevant transcripts linked to the literature review and the conceptual framework were organised into codes and themes and analysed to understand current land governance inefficiencies issues within the real estate sector and their impact on land reform in South Africa. This chapter also highlights the triangulation process involving the document analysis, outcomes of blockchain land registry pilots and interview findings for conducting analysis, highlighting policy implications, and making recommendations in line with the research questions.

Chapter Five interrogates and analyses some of the documents relevant to understanding land reform and land registry governance processes, key stakeholders and key laws, as well as existing Deeds Office structures, services, processes, policies, systems, and technologies. The study also reviews documents to understand the processes of property purchase, deeds lodgement, title deeds registration in general, the registration of title deeds for land reform programmes (e.g. subsidised houses and affordable housing) and the root causes of the current subsidised housing title deeds backlog.

Chapter Six analyses the transcripts from the expert interviews conducted with selected key stakeholders within the real estate sector affected by the land registry and land reform. Interviews with key institutions such as the Banking Association of South Africa (BASA), the Deeds Office, the Property Practitioners Regulatory Authority (PPRA), Corruption Watch, the CAHF and the Legal Practice Council of South Africa (LPC) have provided sufficient evidence on the current land registry governance inefficiencies and how they enable corruption and fraud. Furthermore, interviews from blockchain solutions providers such as ChromaWay and Seso Global provide lessons from extant pilots and evidence for how blockchain capabilities could enhance the land registry.

Chapter Seven applies the IAD framework alongside principal-agent and collective action theories to look at decentralisation, technology innovation in the public sector and digital transformation to drive the implementation and the adoption of a blockchain land registry. It also draws on the concept of public good to constitute the conceptual framework. It analyses the potential of PPIs to drive innovation, technology adoption, and land registry decentralisation to increase transparency, accessibility, auditability, security, reliability, and accountability. This chapter triangulates the findings from the document analysis with the interviews and the blockchain pilots conducted in South Africa and in other countries to analyse the evidence.

Chapter Eight concludes the research and makes recommendations on the required institutional reforms based on the evidence discovered through document analysis, expert interviews, and the triangulation with the literature review, blockchain land registry pilots outcomes, the analysis and discussion, conducted for the research questions. Informed by empirical findings, this chapter concluded that blockchain can enhance the public good of the land registry, improve land governance and strengthen property and land restitution. In addition, this thesis also concludes that decentralised blockchain land registry can, by providing tamper-proof historical data and information, be used to detect corruption and fraud, verify transactions and be used as evidence during some investigations into malfeasance. The chapter also concludes that the land registry, in its current form, caters for middle- and high-value properties and works quite well for the rich. Low-value properties and areas such as townships, communal land and informal settlements (in other words, where the majority of South Africans live) remain marginalised and are much more commonly victims of fraud. This chapter demonstrates that an inclusive, complete, secured, decentralised blockchain land registry as a public good can indeed support land reform and limit corruption and fraud issues, especially around government land reform initiatives such as subsidised and affordable housing. This chapter also demonstrates that blockchain can achieve effective governance by enhancing the transparency, accessibility, auditability, security, reliability, and accountability of the land registry. One of the key recommendations from this chapter is that the ECTA and EDRSA need to be amended to allow electronic signatures for immovable properties so that blockchain capabilities such as smart contracts can be adopted and fully leveraged.

CHAPTER 2: LITERATURE REVIEW

This chapter considers the relevant literature dealing with land governance issues such as corruption and fraud and their impact on land administration, property management, land restitution and land reform in South Africa. While the applications of blockchain technology are still being defined in an extremely fast-moving field, there are not yet many tested use cases, particularly outside of cryptocurrencies, or related to creating secure public services within weak institutions, particularly those with the potential to build much-needed trust in vulnerable or deficient states (Atzori, 2017). Furthermore, the scholarly theoretical debate around this subject is still in its infancy and mostly dominated by technical, financial, and legal issues related to cryptocurrencies (Atzori, 2017). The blockchain cryptocurrency use case should therefore not be used as a blueprint for all blockchain use cases or for the land registry use case.

Beyond blockchain cryptocurrency use cases, there is a need to critically review and ask important questions about the meaning of decentralisation and consensus in the context of the land registry, especially given the fact that land and property are not traded daily or as frequently as financial products such as cryptocurrencies. This literature review examines management inefficiencies that enable corruption and fraud, and transparency and accountability in the context of good blockchain governance, innovation, technology, and decentralisation. It also examines the literature on both public and private blockchains, blockchain versus traditional databases, digital signatures for the transfer of property agreements, the blockchain land registry use case, and blockchain deployment models for a land registry.

2.1 Land Reform in South Africa

The purpose of South African land reform, as described in the White Paper on Land Reform (1991), is to redress the injustices of apartheid, improve national reconciliation and stable

economic growth, and alleviate poverty (Pienaar, 2009). This same sentiment is echoed by Sibanda (2001). The state must provide legal certainty, security, and protection for different bundles of rights to redistributed land. These include the primary reassertion and legal recognition of land as a public good with an inherent social value that trumps private property ownership, and the recognition of diverse forms of tenure beyond private title deeds (de Satge and Cousins, 2019). To address the consequences of the legacy of apartheid with respect to land, the South African Constitution includes the following three clauses:

- The Bill of Rights, Chapter 2, Section 25 (7) of the Constitution of the Republic of South Africa (1996) states that a person or community dispossessed of property after 19 June 1913 as a result of past racially discriminatory laws or practices is entitled, to the extent provided by an Act of Parliament, either to restitution of that property, or to equitable redress.
- Chapter 2, Section 25 (5) states that the state must take reasonable legislative and other measures, within its available resources, to foster conditions which enable citizens to gain access to land on an equitable basis.
- Chapter 2, Section 25 (6) states that a person or community whose tenure of land is legally insecure because of past racially discriminatory laws or practices is entitled, to the extent provided by an Act of Parliament, either to tenure which is legally secure, or to comparable redress.

Moreover, the NDP (2012) stated that land reform will unlock the potential for a dynamic, growing and employment-creating agricultural sector. The NDP also bases land reform on the following objectives:

- To enable a more rapid transfer of agricultural land to black beneficiaries without distorting land markets or business confidence in the agri-business sector.

- To ensure sustainable production on transferred land by making sure that human capabilities precede land transfer through incubators, learnerships, mentoring, apprenticeships, and accelerated training in agricultural sciences.
- To establish monitoring institutions, such as Corruption Watch, to protect land markets from opportunism, corruption, and speculation.
- To bring land-transfer targets in line with fiscal and economic realities to ensure that land is successfully transferred.
- To offer white commercial farmers and organised industry bodies the opportunity to contribute significantly to the success of black farmers through mentorships, chain integration, preferential procurement, and meaningful skills development.

Regarding farming, all land reform beneficiaries should enjoy secure property rights in the form of tight contracts in the short term, and then either long-term leases or freehold titles (de Satge and Cousins, 2019). In 2020, the South African government announced a plan to allocate a further 700 000 hectares of state land to black farmers to accelerate land reform (Didiza, 2020). However, the Minister of Agriculture, Thoko Didiza (2020), acknowledged that the administration of state land had been deficient to date, and that corruption was a problem. Furthermore, the deputy minister indicated that the application and vetting process would be closely monitored, and the department would screen and interview potential recipients (Kiewit, 2020). Some in government have acknowledged that inefficiencies, corruption, and fraud are some of the contributors to the slow progress of land reform. In 2020, the South African president, Cyril Ramaphosa, suggested that the land reform programme was yet to achieve its objectives in his state of the nation (SONA) address. President Ramaphosa also conceded that the country's land reform programme was taking too long to address the challenge of land ownership inequality in South Africa. Bureaucratic delays, patronage and political influence, and opportunism among beneficiaries and landowners are among the challenges that have hindered South Africa's land reform programme's progress (The Conversation, 2021). At the

heart of the problem is the poor capability of the state, characterised by inefficient coordination, limited and misaligned allocation of resources (both public and private, particularly in the finance sector), and corruption (Government of the Republic of South Africa, 2019). Thinking in silos (i.e. separating issues of redistribution, restitution and tenure without a coherent view of how they are linked) has contributed to a crippling fragmentation in programme design and implementation (de Satge and Cousins, 2019). The willing buyer, willing seller approach, combined with institutional dysfunction and poor governance and leadership, has contributed to a slow, corruption-riddled land reform process with inflated land prices, haphazard and unstructured land acquisitions and allocations that continue to perpetuate inequalities (Advisory Panel on Land Reform and Agriculture, 2019).

2.2 Land Registry Governance Inefficiencies

According to Pienaar (2009), unsolved land tenure problems and ineffective land administration may result in economic and political disaster. Furthermore, Pienaar (2009) also highlights the fact that Section 195 (1), (f) and (g) of the Constitution states that public administration must be accountable, and transparency must be fostered by providing the public with timely, accessible, and accurate information. Schneider and Nega (2016) noted that formal enforcement of property rights in many sub-Saharan African countries is challenging due to traditional land tenure and ownership systems.

The Urban LandMark Report (2011) stressed that title deeds are important as they provide individuals with an address, recognise the owner and their family as being part of the municipality, and enable ownership of the property to pass on to family members in the event of death. Title deeds also contain key ownership and property information that assist with fraud and corruption investigations. This means that title deeds involving land reform beneficiaries could be captured and traced within the land registry to assist in dealing with corruption and fraud.

With land and property rights for citizens enshrined in the Constitution and the restitution of those rights to those deprived of them recognised as one of critical aspects for redressing the past injustices, creating a secure, digital land registry accessible to all citizens will support land reform, security of tenure and the transitioning of the South African economy into a digital one.

According to the World Economic Forum (2022), the digital economy is the economic activity that results from billions of everyday online connections among people, businesses, devices, data and processes. The backbone of the digital economy is hyperconnectivity, which means the growing interconnectedness of people, organisations and machines that results from the internet, mobile technology, and the internet of things (IoT) (WEF, 2022). For developing countries, there is significant promise that the digital economy will boost economic growth, raise the productivity of capital and labour, lower transaction costs and facilitate access to global markets (Dahlman et al., 2016). Moreover, the digital economy contributes to greater inclusion by lowering transaction costs, addressing information asymmetries, and exploiting economies of scale and network effects (World Bank, 2016). The digital economy could lower the costs of purchasing property in South Africa and thus help to limit corruption and fraud issues and make the land registry accessible to the rest of the citizens.

However, Pienaar (2009) argued that the success of a registration system is not dependent on its legal or technical sophistication, but on whether it protects land rights adequately and records such rights efficiently, simply, quickly, securely and at low cost.

Based on challenges and shortfalls in the current system, an improved process based on modern technology and internet-based delivery presents an efficient way of meeting these challenges (Benaters, 2019). Currently, the Deeds Office has the monopoly over the land registry in South Africa with a fairly baseline, unintegrated and fragmented DRS. The question is whether the

current Deeds Office monopoly and the dependence on conveyancers promotes low costs transfers, accessibility for the majority, and sufficient transparency and security to protect citizens from manipulation of land registry records. Do they guarantee accountability by providing the necessary audit trail and evidence in the form of data and information from the current land registry to assist in dealing with corruption and fraud and to support land reform?

Based on Krueger's (1990) definition of government failure, state failure is defined here as consisting of both errors of omission, that is, when the state fails to do things that could have improved economic performance; and errors of commission, which is when the state does things that worsen economic performance. The report of the Presidential Advisory Panel on Land Reform and Agreement (2019) concluded that there is growing evidence of corruption of various kinds in land reform and some of this information was in the public realm. Moreover, the pattern has been confirmed by Special Investigating Unit (SIU) investigations and proclamations: one official of the DRDLR has been successfully prosecuted and convicted, and others suspended with investigations pending (Presidential Advisory Panel on Land Reform and Agreement, 2019). Many allegations of corruption, nepotism and abuse of power have come to the attention of the panel and its members. Land policy and implementation modalities need more stringent conditions and oversight to stem these practices, and the institutional constraints that enable corrupt practices to flourish need to be identified and addressed head-on (Presidential Advisory Panel on Land Reform and Agreement, 2019). There is a need to investigate the viability of a highly transparent, accessible, auditable, secure, reliable and inclusive decentralised blockchain-based land registry that facilitates greater involvement by all key stakeholders including ordinary citizens (buyers and sellers), and removes inefficiencies between the Deeds Office and other key stakeholders such as SARS, CIPC, banks, estate agents, conveyancers and municipalities to help deal with the corruption and fraud elements linked with the implementation of the land reform programme.

2.3 The Impact of Corruption and Fraud on the Land Registry

Corruption covers a wide range of dishonest or fraudulent conduct by those in power (Oxford Dictionary, no date), but especially refers to the abuse of entrusted power for private gain (Transparency International, no date). It is widely accepted as an obstacle to economic and social development, and has a demonstrably more harmful impact on the developing world where resources are scarce and institutions are weak (Camerer, 2008). Corruption is illegal rent-seeking whereby the rent-seeker uses bribes to influence public officials and is one of the most damaging effects of rent-seeking is the destabilisation of property rights, because the creation or reallocation of rents always requires appropriate changes in rights (Khan, 2004). Despite the land reform objectives of economic and social development, corruption and fraud in South Africa have contributed towards slow economic growth and a high unemployment rate. Advocates for private sector-led land redistribution argue that the state is incapable of planning and managing the redistribution of land. They point to widespread corruption and fundamental misalignments of state functions which means that beneficiaries do not receive adequate support (de Satge and Cousins, 2019).

Land reform, which should offer the base for meaningful fundamental and structural reforms, has been subject to corruption and fraud, contributing to increased levels of poverty and inequality, and undermines the government's efforts to achieve equitable distribution of land as initially envisaged in 1994. The basic causes of corruption are political and bureaucratic monopolies coupled with an element of poor discretion and weak mechanisms of accountability (Klitgaard in Camerer, 2008). Grand corruption involves a small number of powerful players and large sums of money. The corrupt seek government contracts, privatised firms, and concessions; they pay legislators to pass favourable laws and cabinet ministers or agency heads to enact beneficial regulations (Rose-Ackerman, 2016). Moreover, petty corruption is easier for

ordinary citizens to observe and experience: bribes may be paid to avoid speeding tickets, evade taxes, or gain access to government services (Rose-Ackerman, 2016).

According to Corruption Watch (2019), there are a few ways in which land corruption happens, but some of the common risk areas involve land transactions between governments, companies, traditional leaders and communities; land reforms (when laws are created or changed); and when there are plans to develop the land. Moreover, Corruption Watch (2019) has highlighted forms of land corruption and fraud which include bribery, procurement irregularities, misappropriation of resources, political corruption, and ‘sextortion’.

- **Bribery:** This is when people are asked or offer to pay an amount of money to fast-track service delivery or obtain favours that they would otherwise not be entitled to or would have to wait for. Bribes are usually paid to register a piece of land in a person’s name, receive official documents or get approval for building permits. One of the most common forms of corruption is bribery of land officials to facilitate access to information and services, or to achieve favourable outcomes for a variety of issues, such as land valuation, development planning, resolution of disputes, or formal allocation of land rights (Corruption Watch, 2019).
- **Procurement Irregularities:** These occur when a government department, agency or any other state institution awards a tender to a company to develop a piece of land without following proper processes. In some cases, the officials awarding the tenders are connected with these companies and may benefit from the huge amounts of money they are paid. (Corruption Watch, 2019)
- **Misappropriation of Resources:** This refers to the improper use of resources (including land, vehicles, etc.) which someone has been entrusted with (Corruption Watch, 2019).

- **Political Corruption:** This usually involves public servants, elected officials and corporations who collude to make laws and agreements that benefit businesses or private interests at the expense of ordinary citizens (Corruption Watch, 2019).
- **‘Sextortion’:** This occurs when a person, often a woman, is expected to give sexual favours to officials so that they can be granted rights to a piece of land or housing (Corruption Watch, 2019).

In addition to the acceptance of bribes, corruption may take the form of fraud through the alteration or forgery of land records and documents, multiple allocations of the same plots of land, taking ‘kickbacks’ from business relationships or colluding with parties with interests in acquiring, disposing of or developing land (Kakai, 2012; Obala and Mattingley, 2014). There is a need for reliable and accurate information and records of property, land ownership, property and land values that are not prone to manipulation (Kakai, 2012; Obala and Mattingley, 2014). In addition, it appears that the sale of land and plantation shares is not free from corruption, nepotism, favouritism and clientelism, often being abused for the benefit of family and friends, even though issuing property rights to land that rightfully belongs to others (Molen and Muhalar, 2007). Zuniga (2018) also identified areas vulnerable to corruption in land administration: the demarcation and titling of land, identification of the land according to state categories, land valuation, land sales, and leasing. Usually, the demarcation of land is a necessary requirement for titling a property, and the process may encourage forms of petty corruption, such as bribery during demarcation or when individuals seek to have their land registered (Zuniga, 2018). Moreover, governments hold a powerful tool in being able to define land as unused, underutilised, vacant, of public interest or of public purpose, with the category of unused often employed to facilitate land capture for the personal gain of the elite. Furthermore, during the process of the valuation of the land, to undervalue or overvalue the land may be a powerful tool of coercion and subject to bribery, and in selling or leasing land,

especially for commercial purposes, public officials or community representatives may be subject to bribery by investors (Zuniga, 2018).

According to Transparency International (2013), corruption in land-related services in Africa is an endemic problem that has affected half of all citizens on the continent in recent years. Furthermore, land corruption is the abuse of entrusted power for private gain while carrying out the functions of land administration and land management (Transparency International, 2016). It could take the form of a bribe demanded by a housing official, a dodgy business deal between private investors and local authorities that forces local communities off their land, customary laws that deny women their land rights, or a fraud scheme by bogus property developers. This kind of corruption plays out in the public and private sectors and affects rural and urban citizens alike (Transparency International, 2016). Moreover, one of the most common forms in which corruption occurs is in the bribery of land officials to facilitate access to information and services; favourable outcomes of administrative decisions in land valuation, development planning; and resolution of disputes or formal allocation of land rights (Transparency International, 2011). In South Africa, the Institute of Race Relations (2018) argued that the land reform process has often been abused to benefit elites with good political connections. Some officials have also acted fraudulently, inflating the prices which farmers are prepared to accept for their land and then, when the state pays out the larger sums, pocketing the difference.

According to Transparency International (2013), the results suggest that countries confronting pervasive public sector corruption are also suffering from a corrupt land sector. Although social values and practical norms play a role in framing corruption, the prime incentives for corruption in land governance at a national level are profit and personal gain through the extraction of bribes and profits from land sales and development via administrative and petty corruption. An additional incentive is the use of land as an asset for patronage to consolidate political power and influence in cases of political corruption (Koechlin, Quan and Mulukutla, 2016).

Around the world, one in five people report that they have paid a bribe for land services. The high percentage of bribery in the land sector creates a substantial informal cost for those trying to register or transfer land. It may make land services inaccessible to those unable to afford these illegal payments. (Transparency International, 2013)

This occurs because of the high level of discretionary power, authority, and access to rent-seeking opportunities that land officials have as a result of the complexity and lack of clarity of land administration procedures (Koechlin, Quan and Mulukutla, 2016). Furthermore, public officials are the main actors in petty and administrative corruption in securing land access, land rights and outcomes of planning and land allocation decisions. In some cases, customary leaders often operate in collusion with land professionals, and commercial developers. Politicians and high-ranking public officials are key actors in cases of grand, systematic, and political corruption (Koechlin, Quan and Mulukutla, 2016). Reducing the dependence on public officials and land professionals such as conveyancers and making land registry processes more transparent could assist in dealing with some of the grand and petty corruption and fraud.

Research indicates that most citizens experience corruption when interacting with the state over immigration, social grants, or housing, and where there is a monopoly over the allocation of social goods (Klitgaard, 1988). Officials are likely to be most corrupt where they have wide discretion for their actions, little accountability, and considerable monopoly power (Camerer, 2018) According to the Advisory Panel on Land Reform and Agriculture (2019), corruption has affected land reform in a variety of ways and the net effect has been to redirect benefits away from the intended beneficiaries, especially the poor.

The role of land as a means of patronage in the consolidation of political power may foster situations in which land-titling and administration systems become captured by chains of corruption (Kakai, 2012). Rent-seeking and fraud by land officials involved in organised schemes for the acquisition and disposal of public land for residential and commercial

development lend themselves to the payment of bribes and kickbacks to private surveyors, lawyers and others (Koechlin, Quan and Mulukutla, 2016). Klitgaard (1988) says that efforts can be made to reduce discretion and increase transparency and accountability. Furthermore, corruption is more likely where transparency and oversight are low, monopoly and discretion are high, and accountability mechanisms are weak (Klitgaard, 1988). The Advisory Panel on Land Reform and Agriculture (2019) identified five ways in which corruption has manifested in land reform: pure market opportunism (bribery and manipulation of land prices and beneficiary selection); asymmetrical joint ventures and fronting; government officials meddling in projects; political interference; and illegitimate, undemocratic, and unaccountable transacting of community land.

Anti-corruption measures need to be supported by an institutional matrix of legal and oversight systems to ensure the effective prosecution of offenders. According to Keudel et al. (2023), research revealed that digitisation can significantly increase the openness, publicity, and transparency of public administration; help identify corrupt connections, schemes, and relationships; optimise anti-corruption activities of law enforcement agencies; and limit the opportunities for corrupt officials. Blockchain may, at least, provide immutable data as evidence for such processes. To reduce corruption successfully, however, ICT-enabled initiatives must move from increasing access to information to ensuring rules are transparent and applied and building the abilities to track the decisions and actions of government employees (Bhatnagar, 2003). Systems to detect bribery and corruption within land registration and valuation offices are largely non-existent (Molen and Tuladhar, 2007). The cost of bribes paid to land services is also the highest, and these illegal payments typically are made to register land, transfer titles, pay property taxes and secure the right to lease government lands (Transparency International, 2011). This thesis seeks to investigate whether the decentralised blockchain-based land registry could become a system that could assist in detecting bribery and corruption, as highlighted by Molen and Tuladhar (2007).

When dealing with vulnerable clients, property professionals should be proactive in helping to protect them. This would include protection of those who rent out their properties or own vacant properties (Elkins, 2015). A person who rents out their property, particularly if they have lived there previously and have moved, must be very careful that they have notified all relevant authorities of their new address and should arrange for their mail to be diverted to a safe, new address (Elkins, 2015).

There is no society that is totally free of corruption, and no strategy can guarantee successful development forever (Johnston and Kpundeh, 2002). However, many societies have limited corruption through the broad-based mobilisation of a diverse range of citizens willing and able to defend themselves by making meaningful demands for accountability of and limits upon official power, and for an end to illicit advantages enjoyed by others (Johnston and Kpundeh, 2002). This thesis investigates whether the mobilisation of key stakeholders, as argued by Johnston and Kpundeh (2002), through PPIs around the land registry and deploying a decentralised blockchain-based land registry could assist in dealing with some of the corruption and fraud.

2.4 Transparency and Accountability

According to Fox (2010), the concepts of transparency and accountability are closely linked, and transparency is supposed to generate accountability. Corruption in land is often the culprit or the result of the breakdown of a country's overall governance. Recent findings by Transparency International (2016) show that there is a very strong correlation between levels of corruption in the land sector and overall public sector corruption in a country. Lack of transparency in investment chains and company ownership structures and, at the midstream level, in land allocation for investment purposes renders the systematic identification of involved actors and specific types of corruption problematic. Systemic enablers of corruption have been identified as the prevalence of discretionary powers within land administration; the

role of parallel institutions for land management, including overlapping formal and customary institutions and the partial or non-recognition in law of established customary rights; and extensive state powers and non-transparent procedures for the allocation and privatisation of public land. The resulting complexity of administrative procedures confers considerable discretionary powers on officials, who can exert control over land allocations and development schemes (Koechlin, Quan and Mulukutla, 2016). Camerer (2008) has argued that, to maintain the credibility of anti-corruption efforts, institutions and systems must be strengthened and reformed to entrench transparency, accountability and, above all, fairness. Furthermore, to be effective, sustainable reforms require credible information, functioning institutions and an active and engaged civil society (Camerer, 2008).

There is a consensus that transparency, when information about a decision-making process is made public and is easily verifiable both in terms of the rules and the identities of the decision-makers, increases the probability of the detection of corruption. Transparency allows detection of and deters corrupt behaviour because it lowers the information barrier, allowing for scrutiny and monitoring (UNDOC, 2020).

Proactive publishing of information by the Government and simplifying administrative procedures are additional ways of promoting transparency that go beyond the traditional access to information practices (UNODC, 2020).

2.5 Land Registry Decentralisation Case

Currently, the land registry is centralised within the Deeds Office, and this comes with some limitations that contribute towards corruption and fraud and negatively impact the implementation of land reform. Bennett et al., (2021) notes that, currently, the trusted third party (i.e. the state, or, in some case, a religious institution), not only witnesses deeds, but also makes and stores copies at a central location. The input or responsibility of the third party, in

terms of verification of the legal validity of the transaction, and the associated liability assigned to the third party in the case of fraudulent activity instigated by the transacting parties, may have been rather limited. The formidable innovation introduced by this technology is that the network is open, and participants do not need to know or trust each other to interact. Electronic transactions can be verified automatically and recorded by the nodes of the network through cryptographic algorithms and without human, central authority, point of control or third-party intervention (e.g. governments, banks, financial institutions, or other organisations) (Atzori, 2017). Antonopoulos (2014) indicates that “the fact that there are suggestions that blockchain could do away with central authority or third parties calls for an investigation into how a decentralised consensus-based land registry can support land reform and assist in dealing with corruption and fraud”. Furthermore, “the rationale for this protocol is the decentralised trust or trust-by-computation. Its importance can hardly be overstated and indeed, it represents a shift from trusting people to trusting maths” (Antonopoulos, Interview, 2014). Decentralisation could become a reality if other stakeholders within the real estate sector, such as banks, SARS, CIPC, developers, and municipalities, could be involved and give final consent during the transfer of property processes within an integrated land registry.

Many enthusiasts simply promote blockchain as a more efficient, decentralised and consensus-driven public repository, which could have a number of applications to make citizens less dependent on governments (Atzori, 2017). The fact that blockchain is decentralised and consensus-driven could assist the Government to transform the land registry with more players performing the role of the Deeds Office and giving consent to the final title deeds registration. This would make processes more transparent and increase accessibility for the rest of the population.

Furthermore, we are at a stage in history when individuals could gradually overcome any centralised political institution through algorithm-based, distributed consensus and create the conditions for an idealistic society of equals, characterised by flat, rather than hierarchical,

structures (Atzori, 2017). However, in a country where land corruption and fraud are rife, it is important for policy makers to ensure that technology innovations such as blockchain, that have a potential to replace third parties who normally play a watchdog role within the society and economy, do not exacerbate the current levels of corruption and fraud. To decentralise services through blockchain does not mean to dismiss the state, but to foster better governance. Blockchain is not a tool for promoting lawlessness or anarchy; the objective is rather to prevent the excessive concentration of power in the hands of the few and to make legal frameworks more granular and tailored to the needs of citizens (Swan, 2015). In the future, centralised authorities could become increasingly irrelevant in the context of blockchain technologies, with their role shifting to providing a platform and governance for decentralised services rather than being at the centre of every transaction (OECD, 2018). This study explores how to bring additional participants together to co-manage the land registry and address current land governance inefficiencies. It explores how to support land reform by preventing corruption and fraud before they occur or before the conclusion of a transaction instead of relying only on the Deeds Office and government departments to facilitate and monitor land registry processes.

Wily (2003) concludes that there are signs that governments do not always sustain their enthusiasm for decentralised mechanisms when they confront the realities of implementation or the loss of control over the periphery that some of the more genuine moves towards decentralisation embody. Decentralisation does not necessarily imply real or complete devolution of authority, nor democratisation, in respect of to whom authority is transferred. Moreover, Wily (2003) highlights some of the factors that determine whether the resulting registration system would be simpler and cheaper:

- Whether or not the procedures leading up to recordation (i.e. the adjudication of rights) is being carried out at and by the local level or by professional or government bodies, thereby incurring higher costs.
- Where the registry and, therefore, final documentation work, is located.

- Whether formal surveys and mapping are required for a land right over a parcel to be registered.
- Whether the nature of the right alters upon registration and thereby enters a new system for its administration or retains its existing integrity and mode of administration (generally customary).

To ensure their long-term sustainability, blockchain deployments and initiatives need to strengthen institutional capacities (Zambrano, 2017). As highlighted by Wily above, there is a lot in terms of governance issues that needs to be considered outside the blockchain platform itself to shift successfully from a centralised land registry environment to a decentralised one. To address some of the land reform programme challenges, one proposal is the creation of a Land Reform and Agricultural Development Agency. President Ramaphosa announced the creation of such a body in his 2021 SONA. The idea developed out of proposals on decentralising land reform first set out in South Africa's 2012 NDP. The ideas in the plan were echoed in a 2019 report by the Presidential Advisory Panel on Land Reform and Agriculture, which argued that the central principle is to locate the responsibility of redistributive land reform within district-level land committees. These would design locally based solutions created for the dominant farming enterprises while considering an area's community and social dynamic (The Conversation, 2021). According to Konashevych (2019), if the aim is decentralisation, then blockchain is the answer and there is no other scalable technology for this objective that has been created so far.

2.6 Good Governance

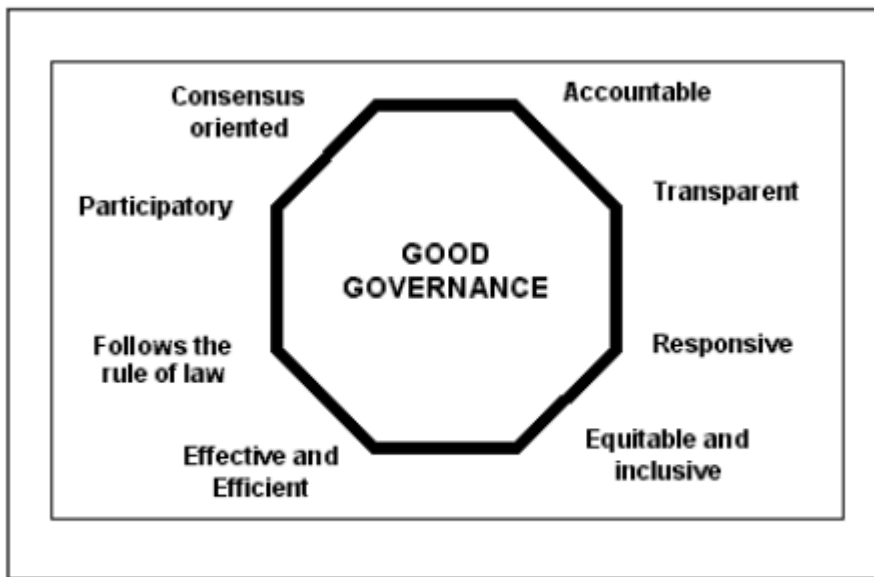


Figure 2-1: Characteristics of Good Governance (Source: The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP))

In the South African situation, it was confirmed in *Tshishonga v Minister of Justice and Constitutional Development* that good governance practices in the public sector include anti-corruption measures, open and democratic decision-making, unbiased allocation of funding, measures to combat nepotism, and strict financial control and management of funding (Pienaar, 2009). Good governance refers to all kinds of institutional structures that promote both good substantive outcomes and public legitimacy, with a focus on corruption as it undermines good governance (Rose-Akerman, 2016). The avoidance of corruption is one obvious aspect of good governance (Food and Agriculture Organization, 2007). However, features of good governance include accountability, political stability, government effectiveness, regulatory quality and rule of law, in addition to control of corruption (Food and Agriculture Organization, 2007). Gisselquist (2012) argues that almost all major development institutions today say that

promoting good governance is an important part of their agenda. Gebrihet (2022) argued that good governance positively affects urban land administration because it can make officials and staff accountable, transparent, impartial, and responsive. Moreover, it can also open the door for the involvement of the public in urban development, and any weakness in any of the principles of good governance opens the way for corruption and compromises service delivery (Gebrihet, 2022).

Good governance means different things not only to different organisations, but also to different actors within these organisations. Those who favour a more social approach to good governance state that it involves ideas and values underpinning how a state should act towards individuals (De La Harpe, Rijken, and Roos, 2008). Moreover, human rights are seen as a way to set minimum standards for how a state should govern and good governance should be defined primarily by human rights standards and only secondarily by economic and managerial criteria (De La Harpe, Rijken, and Roos, 2008). The human rights aspect of good governance is important to this thesis in the sense that land reform is meant to restore justice for the majority of citizens who have been deprived of the basic human right to own land and property.

According to the Organisation For Economic Cooperation and Development's (OECD) policy framework on sound governance, in order to ensure openness and transparency, government should consider answering questions such as: "to what extent does the government proactively make available clear, complete, timely, reliable and relevant public sector data and information that is free of cost, available in an open and non-proprietary machine-readable format, easy to find, understand, use and reuse?" (OECD, no date). Good governance has eight major characteristics, namely that it is participatory, consensus-oriented, accountable, transparent, responsive, effective, efficient, equitable, inclusive, and follows the rule of law (UNESCAP, 2009). Furthermore, according to Racetin, Pamukovic, Zrinjski and Peko (2022), by analysing the above eight major points of good governance, it can be concluded that it is a framework in which blockchain technology could very easily fit. Despite some efficiencies that already exist

within the Deeds Office, an assessment of the current land registry would establish whether it allows for sufficient participation by all citizens, is transparent enough, promotes accountability, has consensus-oriented governance processes, and, most importantly, is accessible at a very low cost to accommodate all citizens.

The lack of decentralisation is an inefficient foundation for good governance, making it hard to achieve sustainability, and development and harmony between central and local governments (Ali, 2008). Decentralisation is seen as an effective mechanism underpinning good governance, alongside accountability, predictability, and transparency (Al-Sharafi et al., 2019). Investigations into whether a decentralised, blockchain-based land registry could promote good governance and assist in dealing with corruption and fraud are necessary.

Pienaar (2009) confirms that the movement towards "good, effective, accountable and transparent governance" should be the overreaching cornerstones of good governance. Furthermore, Pienaar (2009) also argued that Section 195 (1), (f) and (g) of the Constitution demands that public administration must be accountable and transparency must be fostered by providing the public with timely, accessible and accurate information. Ba Chien and Nghi Thanh (2022) argue that good governance enables the government and businesses to focus on community development concerns such as job creation, poverty reduction, housing, urbanisation, and education. Investigation into whether promoting good governance within the Deeds Office and around the land registry could indeed support land reform and indirectly address these socio-economic issues.

According to Khan (2006), the current governance and anti-corruption agendas supported by international agencies do not achieve this; they do not identify the structural drivers of corruption or feasible responses to these drivers that are likely to improve development prospects in particular countries. Khan (2006) went on to say that, more worryingly, by setting broad anti-corruption and good governance goals they may be doing damage by setting

unachievable targets for developing countries and diverting attention from critical governance reform. Despite the critics of good governance, this thesis seeks to investigate if decentralised blockchain can implement some of the good governance characteristics as highlighted by UNESCAP to assist in dealing with some of the technical or systemic corruption and fraud enabled through the land registry.

Dosch and Vuving (2008) argue that governance is considered good when ensuring multi stakeholder engagement, transparency in decision-making, accountability, effective management, and commitment to quality and the rule of law. This thesis investigates if the decentralised, blockchain-based land registry can organise key stakeholders, bring more transparency, address some of the existing land governance inefficiencies and provide reliable evidence to law enforcement agencies to uphold the rule of law against those involved in corruption and fraud.

2.7 Land Governance

Land governance or administration involves procedures, policies, processes, and institutions by which land, property and other natural resources are managed, including decisions on access to land, land rights, land use and land development (Markunas, 2019). Gebrihet (2022) points out that land, as a factor of production, is important in urban economic development and productive and efficient cities. Moreover, as a policy tool, urban land administration is important to ensure adequate access to land for urban residents and improving the land governance function improves urban and economic development (Gebrihet, 2022). The enjoyment and regulation of land tenure rights and the realisation of human rights are closely interwoven, especially around land governance: the right to own property, the right to adequate food, and the right to adequate housing (Wehrmann, 2017). Bruce (1993) explains land tenure as a mode of holding rights in land, a system of access to and control over land and related resources or the set of relationships among people concerning land or its use. Weak governance, whether in formal land

administration or customary tenure arrangements, means that the land rights of the poor are not protected. It may leave them marginalised and outside the law (Food and Agriculture Organization, 2007).

Land governance concerns the rules, processes and structures through which decisions are made about access to land and its use, the way the decisions are implemented and enforced, and the way that competing interests in land are managed (FAO/UN-Habitat, 2009). The production, availability and accessibility of reliable data and statistics are of fundamental importance in monitoring and in taking evidence-based decisions for good land governance (Choudhury et al., 2018).

The major challenges in good urban land governance are a lack of material and human resources, commitment, clear rules and regulations, modern service delivery, and budget, as well as rent-seeking behaviour (Siyum, 2022). The UN-funded Food and Agriculture Organization (2007) describes the characteristics of good urban governance as follows:

1. Participatory: enabling citizens to participate fully in governance through consensus-building and to engage with civil society without any curbs on the media or freedom of expression and association
2. Transparent: open in sharing any and all relevant information
3. Accountable: demonstrating stewardship by responding to questions, explaining its actions, and providing evidence of its functions
4. Responsive: delivering services that citizens want and need
5. Equitable: dealing fairly and impartially with individuals and groups, providing non-discriminatory access to records and services
6. Efficient: effective in formulating and implementing policy to support high quality services.

An investigation is required to understand whether blockchain could improve land governance by making the land registry more effective, efficient, transparent, accountable, responsive, and equitable, ensuring the participation of all the citizens to support land reform and assist in dealing with corruption and fraud.

Choudhury et al. (2018) argued that the demand for data as evidence to monitor global and national developmental status and targets is increasing, and data has a potentially revolutionary effect on economic analysis and policy making. This thesis investigates if land registry data can be relied upon as a source of evidence to assist in dealing with corruption and fraud and to assist the government improve its land governance to monitor land reform targets and come up with the necessary policy interventions.

The consensus argues that to generate growth, states have to protect stable property rights, defined by strong contract enforcement, low expropriation risk, and low corruption; they have to ensure undistorted markets defined by low rents; and they have to achieve democratic accountability and civil society participation to keep the state in check (Khan, 2004). Land governance in South Africa should guarantee the protection of property rights for all citizens.

2.8 Innovation

Innovation is a different process to that of invention and involves the implementation or adaptation of new knowledge. There are three elements involved: namely, the actors (innovators), the process (innovating) and the outcome (innovations) (Osborne, 2012). Furthermore, innovation always involves the adoption and implementation of new ideas and may sometimes coalesce indistinguishably with their actual invention or discovery (Osborne, 2012). Innovative uses of technology in this space may be automated using online or mobile hardware and software, such as mobile money that can bypass lower-level officials and reduce the opportunity for bribery; online applications for and issuance of land documents; and online

land records (Koechlin, Quan and Mulukutla, 2016). This presents an opportunity to critically review the Deeds Office's current and planned technology capabilities and adopt innovative blockchain technology to implement the EDRSA to address land registry governance inefficiencies and align with anti-corruption and anti-fraud best practices.

Revolutionary innovation applies new technology to the production process for existing products and markets and creates a gain in efficiency. This approach is important because it does not treat product and process innovation as separate entities but rather explores the relationship between the two, as it does between the producers and end-users of a service or product (Osborne, 2012). Implementation is often seen as the core of innovation, involving the introduction and adaptation of a new idea within a new environment (Osborne, 2012). Furthermore, the advancement of technology in the last two decades, including GPS technology, web-based services, mobile technology, and drone mapping, has made cadastral surveying and mapping much faster, cheaper, and more accurate. While this has created great opportunities to accelerate land-titling programmes and modernise existing land administration systems, it has also created new challenges for many developing countries (World Bank, 2017). Because of the remarkable advantages of automation, transparency, auditability, and cost effectiveness, blockchain may thus represent a disruptive innovation for many varieties of contracts and business activities (Atzori, 2017).

Although there are other innovative technologies being adopted within the land sector to address the current land governance inefficiencies, this thesis focuses on blockchain technology innovation and seeks to establish if it can facilitate the necessary innovation to modernise the land registry. For example, rigid government salary structures and low budget allocations for land administration agencies may severely limit funding for such programmes. Hiring and retaining highly qualified staff to run these new technologies is difficult, and a digital land database is a potential risk to any country's national security in that a government's ability to protect these databases from potential cyber-attacks is limited (World Bank, 2017). In response

to these institutional and skills challenges, there is a body of conceptual literature dealing with PPIs as part of the conceptual framework, which this thesis deals with in greater depth when assessing the potential solutions. The IDRC (2017) suggests that blockchain should not replace current processes. It is more important to consider how the technology could complement or supplement governing processes while also promoting innovation within the public sector.

This thesis acknowledges the existing capabilities within the Deeds Office and the relevant stakeholders affected by the land registry and does not seek to reinvent the wheel but rather to come up with viable policy proposals and recommendations that will see blockchain complementing and supplementing the existing processes. Moreover, this thesis is not focused on corruption outside the land registry but rather on how to secure the land registry itself to assist in dealing with corruption and fraud. Blockchain could bring innovation to the Deeds Office and complement the existing land registry and processes to improve transparency, accessibility, auditability, security, reliability, and accountability.

2.9 Decentralised Blockchain-based Land Registry

According to Santiso (2018), blockchain has two distinctive features that make it a potential tool against corruption. First, it provides an unprecedented level of security for the information and the integrity of records it manages, guaranteeing their authenticity (Santiso, 2018). Second, blockchain provides a transparent and decentralised system to record a sequence of transactions, or ‘blocks’ (Santiso, 2018). Transactions are recorded chronologically, forming an immutable chain, and can be more or less private or anonymous depending on how the technology is implemented (Church, 2018). Furthermore, because of the immutability of blockchain every transaction is fully traceable (Santiso, 2018). South Africa passed the EDRSA in 2019 to allow the Deeds Office to automate its land administration, management manual and paper-based business processes through the e-Deeds Registration System and the e-Cadastre system and to integrate them into other key e-government and stakeholder systems (Parliament

of the Republic of South Africa, 2017). There is more that can be done beyond just automating the current processes in terms of re-configuration and transforming the Deeds Office through decentralisation of the land registry in order to limit corruption and fraud. The reconfiguration could also deal with the current land registry inefficiencies and, as a result, support land reform. This thesis investigates how blockchain could support and enable the Deeds Office and the land registry transformation through decentralisation.

Blockchain allows the land registry to store the details of property sales, leases, mortgages, and any other data that needs to be stored. The creation or destruction of land is rare, as ownership is already demonstrated through a chain of title. Conducting a title search is much easier when historical data is immutably present on a blockchain (Thomson Reuters, 2018). Moreover, this register plays an important role in securing property rights, and it is important to preserve its data as immutable and tamper-proof (Sladic, Milosljevic, Nikolic and Radulovic, 2021). For example, instead of having the Deeds Office solely responsible for managing the land registry, banks, not-for-profit organisations and other real estate and land sector organisations could participate in and co-manage the registry.

According to Bitland “a number of developed and developing countries are currently busy with proof-of-concept applications of blockchain to land registries, such as India, Georgia, Honduras, Ghana, Sweden and South Africa” (Aitken, 2016). Early experiments tell us that initial conditions matter: Georgia is adding blockchain technology onto a relatively efficient land registry system, adding an additional layer of security. Georgia’s government has struggled with managing land titles without corruption creeping in. Bitfury, a blockchain startup, has teamed up with the Georgian civil service to enable government workers to monitor property rights and titling closely (Eastwood, 2017). Moreover, with blockchain, Georgia will be able to make near real-time audits of the registry as opposed to the usual once-a-year auditing process. Citizens will also be able to connect with the registry from mobile devices more efficiently and at a much lower fee (Eastwood, 2017). Furthermore, this improved connectivity aspect is a way

to promote transparency and allow watchdog groups and the media to shine the light on land-titling corruption (Eastwood, 2017). Bitfury's head claims that "blockchain could become the foundation for building a trusted, transparent, and auditable system. This format, therefore, lends itself to property transactions, as property is usually an individual's greatest asset" (Vavilov, 2018). Vavilov (2018) also argued that "often blockchain has trust-based relationships built around it, in the form of mortgages, security and leases, and the biggest risk posed to lenders is fraud, particularly mortgage fraud at an estimate of over £1-billion per annum". When highlighting the strength of blockchain around accessibility and security, Bitfury argued that "in addition to the loss caused by the fraud itself, considerable time is spent establishing the true ownership of a property to prevent fraud. The blockchain-distributed ledger is a database which is not maintained by a single entity such as a government: it is maintained collectively by a number of users and all changes are encrypted in such a way that they cannot be altered or deleted without leaving a record of the earlier state and, therefore, a permanent and secure register that cannot be manipulated is kept"(Vavilov, 2018).

South Africa has one of the best Deeds Registry systems in the world, providing the maximum protection of property due to the strict processes that are followed in registering a property within the Republic of South Africa (MyDeedSearch, no date). It has always been claimed that South Africa has one of the best land registration systems in the world, if not the best. This system of land registration guarantees title and only a court of law can cancel the title to land (South African Deeds Journal, 2008). South Africa's land registry is also hailed as one of the best in the world, but much can still be done to further transform the Deeds Office by putting in controls to assist in dealing with corruption and fraud. In 2009, South Africa ranked 32nd overall globally for the ease of doing business and 87th for registering property, yet, by 2017, South Africa's ranking had slid to 74th overall and 104th for registering property (National Treasury, 2017). This is not necessarily due to negative reforms within the country, but due to other economies implementing and accelerating reforms within their business environment

(National Treasury, 2017). A robust digital land registry that prevents or limits corruption and fraud, could assist with fast-tracking the implementation of government land reform programmes by making the registration process based on title deeds only alterable through the distributed ledger and making the whole process transparent to all key stakeholders central to the land registry, such as buyers, sellers, government officials, banks, estate agents, conveyancers, lawyers, and valuers.

This research study aims to investigate if blockchain technology through PPIs can be deployed practically to create a secure and decentralised land registry in South Africa. It includes expert interviews with some of the selected blockchain solutions providers and reviews of some of the blockchain land registry pilots already conducted in India, Georgia, Honduras, Ghana, Sweden, and South Africa.

2.10 Blockchain Technology

Blockchain has been defined as a decentralised ledger that sequentially records transactions or interactions among users within a distributed network (IDRC, 2017). It maintains a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network (IBM, no date). This shared ledger of transactions between parties in a network is, crucially, not controlled by a single central authority (OECD, 2019). Blockchain technology allows for transactions and data to be recorded, exchanged, and synchronised across a distributed network of different network participants (Sladic et al., 2021).

In simple terms, a blockchain can be described as a public spreadsheet that sequentially records transactions among users operating within a decentralised peer-to-peer (P2P) network (IDRC, 2017). Furthermore, each new 'block' has a unique identifier that is mathematically linked to the identifier of the previous block, creating a chain of blocks. Once validated by the network,

blocks are added to the ledger, and this makes it virtually impossible to alter or falsify blocks in the chain, resulting in a high degree of data security and integrity (IDRC, 2017).

As political, economic, and social systems transform themselves into distributed networks, a new human dynamic is emerging (Bauwens, 2005). The management of this new technology makes an overhaul of our political economy possible thanks to its P2P nature. Blockchain can be used to record any type of exchange, such as audit data, voter identification, property sales, or supply chain origin; and blockchain promises to make P2P transactions more transparent, global, and inclusive (IFC, 2018). Blockchain can be used to embed information and instructions, with a wide range of applications. These include, for instance, smart contracts, namely automated, self-executing actions in the agreements between two or multiple parties; multi-signature transactions, which require the consent of multiple parties for their execution; and smart properties, namely digital ownership of tangible and intangible assets embedded in the blockchain, which can be tracked or exchanged on the blockchain itself (Atzori, 2017).

2.11 Blockchain Value Proposition for Anti-Corruption and Anti-Fraud

Koechlin et al. (2016) recommended that the national governments should introduce appropriate ICT-based approaches to increase transparency and accountability, including independent, secure, credible, and effective whistleblowing hotlines. Proper utilisation of blockchain technology can increase accountability and reduce loopholes in corrupt practices (Azmi and Nugroho, 2023). Blockchain eliminates opportunities for falsification and the risks associated with having a single point of failure in the management of data (Santiso, 2018). Moreover, Santiso (2018) also argued that it can help overcome the data silos in traditional bureaucracies in which public entities are reluctant to share information, directly affecting transparency. A second set of promising applications concerns the registration of assets and the chain of custody, in particular the property registry and land titling (Santiso, 2018). Furthermore, building immutable title systems on blockchain could help to stamp out fraud,

encourage people to record unregistered land and banks to lend against land (Santiso, 2018). If unregistered land could finally be registered, the land registry would become complete and reliable, and the government could draw reports to manage and monitor progress made regarding land reform and for conducting land audits. A secure, decentralised, blockchain land registry through PPIs will increase transparency and encourage more participants to act as whistleblowers by flagging suspicious or fraudulent transactions.

Muhalar (2007) described standardised procedures for the determination, recording and dissemination of information to prevent illegal land transactions and limit discretionary competencies, and to prevent the concentration of powers. Supervision and the possibility of appeal included independent audits, monitoring illegal operations, working with witnesses and special land tribunals to free up normal courts; computerisation is paramount when dealing with large amounts of data, giving people direct access to services, and offering better monitoring of in-progress processes (Muhalar, 2007).

Blockchain establishes a system of creating a distributed consensus in the digital world. This allows participating entities to know for certain that a digital event has happened by creating an irrefutable record in a public ledger. It opens the door for developing a democratic, open, and scalable digital economy from a centralised one (Crosby and Verma, 2015). Although there are other centralised traditional database systems that could also achieve the same goal, the blockchain value proposition is around security, immutable records, smart contracts, decentralisation, and distributed access to the same copy of the database to empower all participating stakeholders and end-users. If there will be additional stakeholders playing a watchdog role through deploying the decentralised, blockchain land registry via PPIs, it could improve governance.

2.12 Blockchain Smart Contracts Capabilities

Table 1. Comparison of traditional contracts against smart contracts.

Criteria	Conventional Contracts	Smart Contracts
Specification	Natural language and legal prose	Code
Identity and Consent	"wet" signatures	Digital Signatures
Dispute Resolution	Judges, adjudicators, arbitrators	Consensus via blockchain Parties via Agreed Upon Digital
Nullification	Parties via legal enforcement Process of breached terms	Nullification workflow and block consensus
Payment	Independent third-party Process	Automatic, based on executed terms (Built into Contract)
Escrow	Independent third-party Process	Automatic, based on executed terms (Built into Contract), or not even required

Table 2-1: Traditional Contracts vs Smart Contracts (Source Bennett, Miller, Pickering, and Kara, 2021)

Sladic et al. (2021) argued that many other fields of blockchain application have been recognised, particularly with the development of smart contracts. Among them is the possible application of blockchain technology in the domain of land administration, mostly as a tool for transparency in developing countries and a means to fight corruption. Buying a house is likely to become cheaper and easier as the government agrees to grant smart contracts validity in law. Smart contracts are legally binding agreements between two or more parties written into a secure database called a blockchain. One of the biggest criticisms of conveyancing is the length of time the process can take — anything from six weeks to six months — and giving all parties access to secure online technology to share documents without the risk of fraud would speed up matters considerably (Homeward Legal, no date). Smart contracts are basically public computer programs that automatically execute the terms of a certain agreement that is defined in its code. Once deployed, the rules may be changed only by democratic vote and any attempt at an action that does not comply with the set rules is programmed to fail (Balietti, 2021). Within the context of the land registry, this thesis investigates if the rules surrounding the lodgement of the deeds by conveyancers could be automated using smart contracts.

Land dealings, such as land transfer or mortgage discharge, are those processes that enable the transferring of rights over a spatial unit of land, from one party to another. In all cases, they require at least two transacting parties — a buyer and seller — and, depending on the local legal and financial systems, numerous third-party actors to support the transaction. A contract or deed, signed by both transacting parties, accompanied by a statutory legal instrument, is usually an essential component (Bennett, Miller, Pickering, and Kara, 2021). Smart contracts supporting land conveyancing, for example, can be implemented on the blockchain, and could be enacted as a somewhat independent technology layer, enabling interaction between transacting parties, the land registry, financial institutions, attorneys, and other parties, while not requiring the wholesale disruption of existing embedded technology arrangements (Bennett, Miller, Pickering, and Kara, 2021).

Smart contracts take the form of code, residing on the blockchain, which can be used to verify and enforce contracts automatically, digitally, and without central authorisation (Bennett, Miller, Pickering, and Kara, 2021). In the smart contract situation, the contract, including the terms of agreement, has been converted to computer code. This is the key characteristic that subsequently enables the downstream execution of many of the contract terms. Tasks can be achieved through automated processes, which may include the transfer of property titles, automated payment of duties or fees, or payment credits to cover escrow accounts. Moreover, decentralised applications (dApps) comprise a broader understanding (than smart contracts) of a class of applications built on blockchain; dApps may consist of smart contracts but aim to provide a full range of end-user online services (Raval, 2016).

The ECTA allows contracts to be concluded electronically but arguably does not go far enough to regulate the execution of the contract through electronic agents, without any human intervention (Adriaan Du Plessis Incorporated, 2020). Furthermore, ECTA views electronic agents in a passive light and as mere tools of communication. It does not differentiate between electronic agents based on the degree of their autonomy and, therefore, the complexity of smart

contracts may not fit into ECTA's conceptualisation of contracting (Adriaan Du Plessis Incorporated, 2020). Wendy Tembedza, an attorney from legal firm Webber Wentzel, suggested that, although the opportunities for smart contracts are vast, issues related to their legal validity and compatibility with growing data protection and privacy laws, such as the Protection of Personal Information Act of 2013 (POPIA), may create real stumbling blocks for their use (Tembedza, 2020). The relatively simple smart contract concept could be implemented without the need for significant land agency disruption, complete IT infrastructure rebuilds, or full database redesign (Bennett, Miller, Pickering, and Kara, 2021). Azmi and Nugroho (2023) argued that smart contracts as a form of blockchain can help make the process more transparent and trackable. This thesis investigates whether blockchain smart contracts could address some of the land governance inefficiencies to support land reform and assist in detecting and preventing fraud and corruption.

2.13 Blockchain Governance

While an argument for the adoption of blockchain is the elimination of intermediaries, there is still the need for the governance of organisations within a blockchain network (Bennett, Miller, Pickering, and Kara, 2021). There is considerable potential in technology innovations such as blockchain for emerging economies, but policymakers have yet to create the governance and regulatory framework for blockchains, not only as cryptocurrency but for the secure recording of events, medical records, and other records management activities, such as identity management, transaction processing, provenance documentation, food traceability, and voting (Antonopoulos, 2014). Regulators need to think more like innovators and adapt quickly to the fast-paced nature of the ecosystem, while businesses should think more like regulators and assume governance responsibility, creating ground rules to protect the reputational integrity and the value of the ecosystem (IFC, 2018).

Governance is about who makes the rules and who enforces them. Furthermore, it is about not only who controls the blockchain but also resolution mechanisms in case of technological collapse, contractual default, and crime (OECD, 2018). If blockchain-enabled markets are to mature, policymakers and businesses must create the rules of engagement together (IFC, 2018). Furthermore, for burgeoning technologies such as blockchain, finding a balance between risk mitigation and innovation will not be straightforward and, if distributed ledger technology (DLT) is applied by businesses to marginally improve existing processes, current legislation should suffice, as processes are already subject to existing regulatory requirements (IFC, 2018).

Decentralisation aims to reduce or prevent such concentration of power and is a fundamental condition for citizens to achieve political efficacy, equality, transparency, and freedom (Atzori, 2017). Since blockchain technology is still in the early stages of development, there is a lack of generally accepted terminology and standards (OECD, 2018). Proposals for new models of governance should be investigated with great care and assessed critically, especially against the risk of promoting anti-political instruments or conceiving politics according to mere market logic (Atzori, 2017).

Furthermore, governance frameworks need to look properly into ways to prevent illegal activities, such as corruption, fraud, illicit trade, and money laundering, to avoid blockchain technology having a negative effect on public governance (Atzori, 2017). To adopt an innovative technology such as blockchain, current governance processes need to be altered and viable policies and regulations for a blockchain land registry need to be formulated. For example, electronic signatures are currently not permitted for immovable properties whereas smart contracts stand to create efficiency. Moreover, the Deeds Office, as per the Deeds Registries Act 47 of 1937 (DRA), is the sole custodian of the land registry. In order to align with best practice, and protect the interests of government, private sector stakeholders, citizens and communities at large, viable policies and regulations must be debated and agreed upon by all key stakeholders, using PPIs as the basis.

2.14 Types of Blockchains

	Public Blockchain (Permissionless)	Private Blockchain (Permissioned)	Consortium Blockchain (Permissioned)
Access	No access restrictions	Invitation only by network administrators.	Restricted to selected consortium members.
Transact	Anyone can transact.	Only designated individuals.	Selected consortium members only.
View	Anyone can view.	Restricted. Shared between trusted parties. No public viewing.	Restricted to selected consortium members.
Type	Large, decentralized Ex. Bitcoin, Ethereum cryptocurrency platform.	Middle ground platforms: <u>accounting</u> and record-keeping procedures.	Participating companies equally involved in the consensus and decision-making processes. Ex. R3, Consensus

Table 2-2: Types of Blockchain (Source: Markunas (2019), The Impact of Blockchain Technology on the Surveying Industry, Cadastre and Land Registry Systems)

The blockchain deployment model must meet the requirements and the objectives of the decentralised land registry, to modernise it and transform the Deeds Office. Public blockchains are open for everyone to participate in and to send and verify transactions, federated blockchains are run by consortia and access to them can be public or restricted to participating organisations, and private blockchains are restricted to members of a specific organisation (Kossow and Dykes, 2018).

2.14.1 Public Blockchain

A public blockchain is permissionless: anyone may join the network and read, write, or participate within the blockchain. It is decentralised and does not have a single entity which controls the network. Data on a public blockchain is secure as it is not possible to modify or alter data once they have been validated on the blockchain (Sharma, 2019).

2.14.2 Private Blockchain

A private blockchain is permissioned: it relies on access controls which restrict the people who can participate in the network. There are one or more entities which control the network, and this leads to reliance on third parties to transact. In a private blockchain, only the entities participating in a transaction will have knowledge of it, while anyone else will not be able to access it (Sharma, 2019).

2.15 Blockchain vs Traditional Databases vs Blockchain Alternative Technologies

Blockchain	Relational Database
No administration required.	Admins and centralised supervision.
Anyone can approach the (public) blockchain.	Only users with privileges can record the database.
Anyone with the exact proof of work can compose on the blockchain.	Only users permitted to read or write can do so.
Slow.	Fast.
Immutable history of documents and possession of digital documents.	No record of documents or possession of digital documents.

Table 2-3: Blockchain vs Traditional Database (Source: Abrol (2021), Blockchain vs. Relational Database: Key Differences)

Two alternative technologies have recently emerged namely Tangle, and Hashgraph (Schueffel, 2017). Tangle does not use “blocks” in the conventional sense. Instead, if you want to carry out a new transaction on Tangle, you have to approve of two previous transactions. When depicting this in a graph it means that you add a new transaction to the Tangle tip, and you are randomly

allotted two previous transactions that you need to validate (Schueffel,2017). Moreover Schueffel (2017) suggested that hashgraph makes use of similar information sharing and probing techniques: one network participant is obliged to share all its information on transactions with multiple other randomly selected network nodes, and the next node will then combine the received information with the information received from other participants and add any information about new transactions.

According to IBM (2019), the primary difference between a blockchain and a database is centralisation: while all records secured on a database are centralised, each participant on a blockchain has a secure copy of all records and all changes so that each user may view the provenance of the data. Furthermore, blockchain removes single points of failure in a database and ensures that, if one of the participants makes a change, it is immediately corrected by the other participants.

After the data self-corrects, the unalterable record of changes will also indicate which participant tried to make the change (IBM Blockchain Pulse, 2019). Decentralisation, using a distributed ledger technology like blockchain, could increase the transparency and accessibility currently lacking in centralised traditional database systems used by the land registry. However, it has limitations if different stakeholders co-manage and monitor the same copy of the database.

Nowadays, the most widely used architecture for the development of distributed systems is known as a client-server. In this architecture, clients request services from servers and deliver the results from those requests back to users via suitable interfaces (Roriz and Pereira, 2019). Servers store all the data and wait to receive requests from clients to complete the necessary processing and return the results.

While this is a very well-known and widely used architecture, with a vast number of successful applications developed and currently running, it suffers from a few problems:

1. The server has a nuclear role in the system, being a major point of failure, in the sense that if the server goes down the entire system goes down as well.
2. Even though security measures might be in place, there is always a chance that the data stored in the server could be changed or removed (Roriz and Pereira, 2019).

Moreover, as Roriz and Pereira (2019) have argued, bearing all these implications in mind allows one to search for new ways to mitigate these problems (and blockchain may be just one answer). Building an application on the blockchain, in which every node is connected to every other node through the network, could help to eliminate the first problem (Roriz and Pereira, 2019). Furthermore, considering the inherent blockchain characteristics of data persistence, data immutability and the consensus mechanisms used to store new data, the second problem is also solved (Roriz and Pereira, 2019).

Instead of the usual central server with a database, blockchain can be both a network and a database combined. There is no longer a single point of failure compromising the entire network, just multiple computers interacting with each other in the same network (Roriz and Pereira, 2019). Although, traditional database management systems and other distributed ledger technologies such as can address some of the current land registry governance issues, especially regarding the automation of the current manual and paper-based business processes, blockchain as a distributed ledger has unique capabilities that can further enhance the land registry in terms of accessibility through network nodes, transparency through consensus mechanisms, reliability due to no single point of failure or central server, and security based on cryptography and immutable records currently not offered by traditional database management systems.

2.16 Electronic/Digital Signatures

The ECTA recognises transactions concluded electronically, facilitates electronic communications and transactions, and allows for the use of electronic signatures (Cliffe Dekker Hofmeyr, 2020). However,, any agreement concluded in terms of the Alienation of Land Act 68 of 1981 may not be signed validly by means of an electronic signature (Cliffe Dekker Hofmeyr, 2020). The category of agreements that fall under the ambit of the Act include sale of immovable property agreements and long-term lease agreements. Moreover, in today's modern, digital world, it is unrealistic that a sale of immovable property agreement is required to be signed in wet ink to be valid and enforceable (Cliffe Dekker Hofmeyr, 2020).

According to Bregmans (2022), Section 4(4) of the Act does not allow electronic signatures for use, amongst others, in the execution of a will or in an offer to purchase immovable property, stating that “this Act must not be construed as giving validity to any transaction mentioned in Schedule 2”. Schedule 2 lists various transactions that may not be concluded electronically, namely: agreements for the sale of immovable property, long-term leases of land exceeding 20 years, wills or bills of exchange (i.e. one cannot have an electronic cheque).

The ECTA defines an electronic signature as “data attached to, incorporated in, or logically associated with other data and which is intended by the user to serve as a signature”. Data is defined as “electronic representations of information in any form”. In a blockchain, each document is given a unique digital code or fingerprint to prove its authenticity and protect its contents. Only verified digital IDs or e-signatures are given access to the document, vouching for authenticity, and preventing fraud (Cliffe Dekker Hofmeyr, 2020).

The Alienation of Land Act requires that a sale agreement for immovable property must be reduced to writing and signed by both parties. Thus, it is not possible to form a binding contract to purchase property, and the Act certainly did not envision a time when contracts for the sale

of land could be signed digitally (Wynne, no date). In order for the Deeds Office to effectively implement the EDRSA and address the current land registry governance inefficiencies, it must leverage blockchain technology features such as smart contracts. This thesis investigates whether both the ECTA and EDRSA need to be reviewed and amended or whether new policy and regulation reforms should be established.

2.17 Suitable Blockchain Deployment Models for the Land Registry

Azmi and Nugroho (2023) argue that the model that can best be applied to this situation is permissioned blockchain because it has a private nature and therefore more control over access. However, a more hybrid model is likely better suited. The term hybrid here refers to designs that tend towards semi-private and more permissioned write access, aligning them with conventional land administration processes. Only identified and authenticated actors would be permitted to write to them (Bennett, Miller, Pickering, and Kara, 2021). Moreover, a hybrid solution that mixes smart contract use with existing technology infrastructure, enabling preservation of the role of a land registry agency as the ultimate arbiter of valid claims, is proposed; this is hypothesised to minimise disruptions, while maximising the benefits (Bennett, Miller, Pickering, and Kara, 2021).

In contrast, Konashevych (2019) argued against permissioned blockchain, suggesting that it has a single point of failure. Users would need to delegate authority to the owner of the network, relying on their goodwill. This is relevant to other centralised technologies, such as more traditional databases, which have already been in use by governments for decades.

The notion of placing an entire title or deed registry, and all related transactions and processes, on the blockchain is fanciful, at least in the short term. Any full tokenisation of property in a given jurisdiction is likely to be many years away (Bennett, Miller, Pickering, and Kara, 2021). Tokenisation is the process of transforming ownerships and rights of particular assets into a

digital form, transforming indivisible assets into token forms (Blockchain Council, no date). Examination of how blockchain could be deployed quickly to address immediate land registry governance inefficiencies will assist in understanding how advanced functionality such as tokenisation, using smart contracts, could be later adopted.

2.18 Blockchain Benefits for Land Governance

Developed countries have launched pilot projects to test blockchain applicability in the land administration domain to increase speed or reduce costs of real estate property transactions in a more secure environment (Sladic et al., 2021). A new distributed database maintaining transactions is disruptive to many industries; it produces a time-stamped, auditing information record (Science Meets Business, 2016). Land administration title offices maintain registries, and records of ownership, boundaries of private and public properties and changes to the properties as they happen.

These changes affect mortgages, restrictions, leases, and rights of way. Blockchain technology has huge potential in land administration contexts as governments privatise land registries or wish to publish trusted copies for all stakeholders without delays (Science Meets Business, 2016). Blockchain protocols in land administration offer complete historical transactions of all land title transactions, reducing dependence on central cadastral databases and may minimise the risk of fraud in data manipulation by a single user (Science Meets Business, 2016).

This thesis investigates whether a blockchain land registry can be deployed through PPIs instead, without having to privatise the land registry, for the benefit of all stakeholders. Furthermore, traditional registry and cadastral systems have not been sustainable in many parts of an advanced technological world. Urbanisation is at its peak and land parcels increase daily. Discrepancies still exist in both the developed and developing world. Blockchain protocol in

land registries could have many benefits, such as cost reduction, smart contracts, efficiency, transparency, and long-term investment (Science Meets Business, 2016).

According to Themistocleous (2018), blockchain can be considered as the future of land registries due to the important benefits it offers. These include increased transparency, trusted and accurate property data, secure ownership of all registered properties, reduced costs, sped up processes, strong auditability for transactions with a timestamp, distributed systems to help disaster resilience, reduced paperwork and the possibility of trading properties remotely. This benefits many participants (e.g. taxpayers, government, insurance companies) assists in the push to build smart cities, eliminates potential fraud, and achieves simpler, faster, and cheaper land registry services. The immutable and transparent nature of blockchain could curb forgery of land titles, create an unmodifiable history of land transactions, and allow real-time verification of land ownership (Shang and Price, 2019).

It is quite evident that there are several ways that blockchain could be used to transform land administration and management processes and address the current land registry governance inefficiencies. Instead of the government privatising the land registry, this thesis explores the possible PPIs that will include both government and private sector players to leverage the benefits of the blockchain technology, to improve transparency, accessibility, auditability, security, reliability, and accountability.

2.19 Blockchain Criticisms, Challenges and Limitations

An understanding of what blockchain technology is and is not is critical in helping policy makers and civil servants look past the hype and critically determine whether blockchain technology may help them advance their missions (OECD, 2018). In a bid to demystify the blockchain hype, Konashevych (2019) cautioned that there is a tendency for politicians and some startups to mislead society by introducing any decentralised solution as a permissioned

or private blockchains. Moreover, the use and implementation of blockchain technology presents challenges, and they are not a solution to every problem in the public sector (OECD, 2018).

Immutability is one of the core characteristics and benefits of blockchain technologies, but it is arguably also its biggest limitation in terms of practical applicability. Decision-makers need to decide if the benefits of using blockchain technology outweigh the inability to update and delete data and must ask themselves whether immutability is practical for the type of data they use (Yaga, 2018). Governments may also have to consider carefully which information is stored on a blockchain and is, therefore, immutable, and which information is stored off-chain, perhaps with only a link or a reference existing on the blockchain (OECD, 2018).

In terms of infrastructure, recent data suggests nearly four billion people do not have access to the internet, most of whom live in the developing world. It thus seems unlikely that people without access would become blockchain network nodes or could run wallet software in order to benefit from the technology as end-users (IDRC, 2017). Additionally, blockchain technology wallets and client software can and have provided friendly interfaces that facilitate public key cryptography, though users need to manage their private keys and store them safely (IDRC, 2017).

These two issues together might prove too demanding for populations with relatively low levels of education and literacy and who already face socio-economic exclusion (IDRC, 2017). South Africa, as a developing country, is also faced with socio-economic challenges such as low economic growth, unemployment, low levels of education and literacy, high data costs, poor connectivity in remote areas and poverty in general which might have an impact in terms of adopting the blockchain-based land registry.

Regulatory entities often lag behind technology innovation, and that is certainly the case with blockchain (Forbes, 2018). Kossow and Dykes (2018) argued that there are many challenges to overcome before the technology can be scaled and legal frameworks need reform to regulate digital currency markets and to harness the full potential of blockchain technology. Governance of blockchains is often cited as a critical issue as the technology starts to achieve wider use in different industries. The issue attracted closer attention after the Ethereum Decentralised Autonomous Organisation (DAO) incident where a token holder used a software bug to funnel about one-third of the total value in the network into their own account (OECD, 2018).

Lawyers, notaries and even land registries in some jurisdictions ensure that a given real estate transaction is concluded in accordance with the minimum legal requirements, and they inform the purchaser about previous encumbrances and rights *in rem* over the property; for example, in mortgage loans, they are even obliged to detect and to inform the parties about possible unfair terms, and notaries are, in most cases, responsible for monitoring transactions to prevent illegal funding activities (Teruel, 2019). Furthermore, blockchain, as a distributed database, can neither inform about the consequences of a certain transaction nor carry out a previous check of the legal requirements by itself. This control is currently not possible with blockchain and smart contracts, which check only the fulfilment of the pre-conditions (Teruel, 2019). Regulatory authorities are thus faced with different challenges, depending on the sector and their mandate, and whether the blockchain is public or private (IFC, 2018).

Other challenges and limitations include data protection and privacy, information confidentiality, scalability, accessibility, and high costs for some users in developing countries. These challenges must be considered when formulating plans to adopt blockchain for a land registry. This thesis investigates whether a system that is private, public or hybrid is suitable or feasible for the deployment of a decentralised blockchain land registry through PPIs. This thesis will also consider some of the current challenges and limitations within the context of South Africa, such as the availability of ICT infrastructure, especially in remote areas, data costs and

digital literacy levels, as these are bottlenecks that could delay the adoption of the blockchain land registry.

Crosby et al. (2015) stated that we live our life precariously in the digital world by relying on a third entity for the security and privacy of our digital assets; whether it is an email service provider telling us that our email has been delivered, a certification authority telling us that a certain digital certificate is trustworthy, a social network such as Facebook telling us that our posts regarding our life events have been shared only with our friends, or a bank telling us that our money has been delivered reliably to our dear ones in a remote country. The fact remains that these third-party sources can be hacked, manipulated, or compromised (Crosby et al., 2015).

Data privacy and cybersecurity are proving to be the main challenges of online services and the blockchain-based land registry may also be subjected to the same challenges. Although blockchain promises strong security features such as cryptography, configuration rules and controls in terms of who accesses what, it still needs to be carefully reviewed, assessed and implemented to ensure that there is sufficient data privacy and data protection.

Konashevych (2019) argued that blockchain is a good technology for the private sector; however, for public administration and public services, this is questionable. Inconsistency of ideas of decentralisation and their implementation is a result of a lack of research and understanding of the technology's capabilities (Konashevych, 2019).

2.20 Key Blockchain Land Registry Pilots

Table 1
Comparison of Blockchain-based land title proposals

	Shang et al. (2019)	Thakur et al., 2019	Mukne et al., 2019	Proposed System
Country	Georgia	India	India	Bangladesh
Challenge	Corruption control	Transparent ownership	Digitized	Archive digitization ongoing
Digitization Level	Land database available	Land database available	Land database available	Digitization is sloth
Proposed model	Incremental two phase	Single phase	Single phase	Incremental three phase
Blockchain Architecture	Public	Public or private	Permissioned Blockchain	Phase one public, next two phases hybrid
PKI	N/A	Certificate authority	OAuth	Multi-party
IPFS	N/A	N/A	Enabled	Enabled
Project implementation	Bitcoin as a layer	Conceptual study	Hyperledger Fabric prototype	Ethereum as a layer at public phase
Government Initiated	Assigned startup	Academic	Academic	Academic
Experimental Result	Phase one successful now moves to phase two	N/A	Prototype	Compared with benchmark

Table 2-4: Comparison of Blockchain-based Land Title Proposals (Source: Alam, Rahman, Tasnim, Akther, 2020)

Pilots and test cases continue to act as a basis for understanding the relative merits, drawbacks, and implementation challenges of the smart contract concept in land administration (Bennett, Miller, Pickering, and Kara, 2021). The process of recognising diverse tenure systems and rights should draw on lessons from experiments and pilots already underway in South Africa and in other African countries. These include low-cost technologies and blockchain options that would, over time, enable locally registered rights to be subject to arbitration and reflected in the Deeds Registry (Advisory Panel on Land Reform and Agriculture, 2019). Below is the highlight of some of the blockchain land registry pilots already conducted in South Africa, Ghana, India, Georgia, and Honduras and assesses whether blockchain capabilities can address governance inefficiencies, support land reform and assist in dealing with corruption and fraud.

- **Ghana:** The Land Administration Project has been working in Ghana for the past 17 years to try to solve land dispute problems, but corruption and nepotism have plagued every area of the public sector, and they have had difficulty accomplishing their goals and consolidating the land title tracking system. Bitland, one of the blockchain solutions

providers, is aiming to inform citizens in Ghana both about blockchain technology and how the technology can change their lives for the better. It is estimated that today in Ghana around 78% of land is unregistered. Given that the Lands Commission wants to solve transparency problems, utilising blockchain-based solutions could bring the transparency and immutability that is needed to ensure the integrity of the public ledgers (Forbes, 2016). In South Africa, the outstanding title deeds for some subsidised houses and properties within communal lands that do not have security of tenure and formal title deeds could benefit from the decentralised blockchain land registry.

- **Sweden:** According to United Nations Blockchain (2017), Sweden is planning to place real estate transactions on blockchain once a buyer and seller agree on a deal and a contract is signed; all parties involved in the transactions — banks, government, brokers, buyers, and sellers — are able to track the progress of the agreement once it is completed, enabling instantaneous confirmation of valid transactions with the highest levels of security and integrity. Sweden's blockchain land registry has concluded the second stage of the trial with the successful deployment of smart contracts. Lantmäteriet, the country's authority for land ownership, has partnered with two banks and telecommunications operator Telia on a blockchain implementation, which research suggests could save the taxpayer \$106 million per year in costs. The end result would be a secure process for real estate transactions and mortgage deeds (United Nations Blockchain, 2017). The South African real estate sector could also benefit from blockchain smart contracts which could automate the current paper-based property purchasing process and bring more transparency to the process by enabling all key stakeholders involved in the process, including buyers and sellers themselves, to monitor the transaction from start to finish which could alleviate some governance issues such as high costs for buying and selling property in South Africa.
- **India:** According to the United Nations Development Programme (UNDP, 2018), blockchain would have a huge impact in the developing world, helping to uplift the poor

and marginalised, aid in fighting corruption and more. The first venture into the world of social good is a collaboration project to build a land registry using blockchain technology for the city of Panchkula, in the state of Haryana in India. The venture represents meaningful and commercially viable proof of concept evidence for land registries in the region (UNDP, 2018). Moreover, the proof of concept leveraged the inherent benefits of the Ethereum blockchain, with a focus on smart contracts to create a single source of truth on ownership status, and history of a property (UNDP, 2018). The buyer would be assured that the land being bought is the correct plot, and that the seller is unequivocally the owner, reducing the potential for disputes, as well as the costs and time involved, for any given transaction; the government office would then enter the sale deed into the system now powered by the blockchain technology (UNDP, 2018). This blockchain-enhanced system would register the sale deed in the presence of the buyer and seller; it would also process the sign-offs by both the buyer and seller and push the transaction to the approval stage. After the transaction is approved, an automatic transfer of ownership would be completed; and, importantly, the system would be able to handle land titles with multiple owners (UNDP, 2018). Furthermore, from the administrator's perspective, there would be significant transparency, accuracy, and efficiency gains; they would be able to view and monitor the state of the property and sale deed in near real-time, as well as have instant access to a complete and permanent transactional history for each property and sale deed (UNDP, 2018).

- **Georgia:** Georgia moved towards blockchain land registries in 2016, enabling seamless integration with pre-existing property registries (Shin, 2017). A quick win for the Deeds Office would be to integrate blockchain with the existing land registry called the Deeds Registration System (DRS). One option could be the replacement of the current database with a distributed blockchain database with superior security features. The distributed nature of the blockchain database could allow other stakeholders — such as the current third parties with private or independent online interfaces to the land registry

like SearchDeeds, Lightstone, banks and municipalities — to have the same copy of the land registry database and be able to monitor transactions, which could potentially result in more transparency and security.

- **Honduras:** In 2015, the government of Honduras reached out to Factom, a United States blockchain technology company, to develop a nationwide land registry system (Andrikos, 2021). Due to corruption, land title fraud is common in Honduras, and, for many years, ill-intentioned public employees could penetrate the register and illegitimately change property ownership. The application of a blockchain land registry solution has eliminated land title fraud, guaranteed seamless protection of property titles and maximised security (Themistocleous, 2018). South Africa’s land reform programmes, such as subsidised and affordable housing, face corruption and fraud risks without an inclusive, complete, reliable and secured land registry.
- **South Africa:** According to CAHF (2019), the Government has built over three million RDP houses since democracy, but an analysis of Deeds Office data indicates that only 1,9 million of these properties have been registered. It is an administratively complex task to formally register these properties: subsidy beneficiaries may no longer be living on the property, they may have sold the property informally or rented items out, and some beneficiaries may have passed away. Furthermore, CAHF, research consultancy 71point4 and Seso Global have partnered together to develop South Africa’s first blockchain-based property register. The pilot study area consists of almost 1 000 properties located in four sites in Makhaza, Khayelitsha. All the properties are government-subsidised properties that have not been registered on the Deeds Registry (71point4, 2019). Kecia Rust of CAHF mentioned that “to create a register of property owners, we first had to go door-to-door to find out who lives in each property and to establish how they came to be there” (ITWeb, 2019). Furthermore, where the beneficiary no longer lives on the property, we are in the process of tracing the beneficiary to confirm information we have gathered on who owns the property and we

will also be working closely with the city on a resolution process where ownership is disputed” (71point4, 2019). It is evident that migrating title deeds to blockchain where properties are unregistered is not simply a matter of data capturing. There are other background processes that need to happen outside the blockchain, such as verifying the beneficiaries or rightful owners. From the proof of concept already conducted, it is evident that blockchain has the potential to increase transparency, accessibility, auditability, security, reliability, and accountability.

Country	Pilot Scope and PPIs	De-centralisation	Immutable Records, Increased Security and Reliability	Electronic Deeds Transfers and Title Deeds	Smart Contracts
South Africa	City of Cape Town (CoCT) municipality (Khayelitsha). PPI: CoCT, CAHF, Mastercard Foundation, 71Point4,	Not decentralised. On-the-ground surveys confirm rightful owners.	Staging site for key documents required for the conveyancing process.	No electronic deeds transfers and title deeds. No integration with the land registry.	No automation using smart contracts.

	and Seso Global.				
Honduras	National Government (Honduras farmers land titling). PPI: National government, Factom and Epigraph.	Not decentralised.	Blockchain integrated with existing land registry to secure and guarantee tamper-proof land titles.	Blockchain technology integrated with land registry for electronic land titles.	No automation using smart contracts.
Georgia	Integrating blockchain into current land registry. PPI: Georgian	Not decentralised.	Blockchain integrated with existing land registry to secure and guarantee tamper-proof land titles.	Blockchain technology integrated with land registry for electronic land titles.	No automation using smart contracts.

	National Agency of Public Registry, Bitfury, Verum Capital and European Bank for Reconstruction and Development (EBRD).				
India	City of Panchkula, state of Haryana. PPI: City and Blockscale Solutions.	Decentralised.	Secured electronic title deeds records.	Electronic title deeds.	Buyer and seller sign offs. Automatic ownership transfer using smart contracts.

Sweden	PPI: Lantmäteriet , (Swedish land registry), Kairos Future, Telia Company and ChromaWay .	Decentralised (Integrated with all key participants: banks, government, brokers, buyers, and sellers.)	Secured records.	All participants are able to monitor transactions.	Smart contracts deployments.
Ghana	PPI: Ministry of Lands and Natural Resources, Land Commission , Barclays Bank of Ghana and IBM.	Decentralised with key participants given access to the database.	Access to the secured digital land registry database informed by off-the- ground verification of ownership.	Electronic title deeds.	No smart contracts.

Table 2-5: Comparison of Blockchain-based Pilots In terms of PPI, Decentralisation, Immutability and Security, Electronic Title Deeds and Smart Contracts (Source: Authors Own Compilation)

Broad, multi-stakeholder engagement is key: networks, meet-ups and expertise building are important to guarantee the implementation and promulgation of the technology (OECD, 2019). The objectives of the pilots range from corruption control to enhancing transparency and security and digitalisation to deal with inefficiencies such as paper-based and manual processes, reduce access costs, processing delays and title deeds backlogs. The scope of the pilots also varied with some at national level and others at local government level. The pilot's public-private interplays are mostly involving stakeholders with keen interest in the land registry and the overall wellbeing of both the land and real estate sectors, namely governments, private sector stakeholders such as the financial services sector, and blockchain technology solutions service providers.

The scope for each pilot varies. Some pilots are not covering advanced features such as smart contracts yet and others are not decentralised except for being integrated with the current centralised land registry database. Given the South Africa case and the current land registry governance issues, blockchain has the potential to enhance the security of the land registry and guarantee the integrity of the records with reliable, historic, tamper-proof property information. This is key to ensuring the restoration of justice in terms of land ownership problems caused by apartheid and to deal with fraudulent land claims in the future. The pilots demonstrated that indeed there is hope, and blockchain could potentially automate current manual and paper-based property purchasing and selling processes which could address the issue of high costs involved in property and land transfers. Countries such as Georgia, India and South Africa have land databases already. This is an indication that there are alternative technologies to blockchain already deployed, which allows countries to assess and evaluate blockchain value propositions compared to other technologies such as traditional database management systems or alternative technologies. This also means that blockchain can complement or augment existing technologies and countries can still leverage their existing digital or electronic land registries.

2.21 Government Readiness and Adoption of the Blockchain Land Registry

Replacing ongoing initiatives or launching new ones on standalone blockchain technology platforms would only delay blockchain adoption. The best approach for developing countries is to deploy blockchain technology to complement or supplement ongoing programmes (IDRC, 2017). The new technological approaches also open up new opportunities for fraud, so most land administration systems have tended to take a conservative stance and have been late technology adopters (Bennett, Miller, Pickering, and Kara, 2021).

In countries where corruption might dominate and the integrity of official documents could be questionable, the use of blockchain could potentially help to provide more transparency through public verifiability. For example, several projects have started to secure land titles on a blockchain, but to date it is unclear to what extent these projects will sustain a wider adoption (Teruel, 2019).

Examples of specific land dealings, or subset use cases of land administration, could include land conveyance, mortgage creation and discharge, or off-plan development approvals. These transactions could utilise blockchain technology through integration with existing land administration technology infrastructures. Rather than seeking to fully re-engineer and shift all land administration processes, data and document storage onto the blockchain, the focus in the short term could be on capitalising on the immediate benefits of the technology to create more efficient specific land administration processes (Bennett, Miller, Pickering, and Kara, 2021).

2.22 Conclusion

This chapter has expanded some of the themes already covered in Chapter One and provided an additional empirical literature review in more depth to acknowledge and understand what other researchers have already discovered in relation to land registry governance inefficiencies,

corruption and fraud within the real estate and land sectors, and the adoption of blockchain to assist in dealing with land transactions and ownership.

This empirical literature review has revealed that corruption and fraud around the land registry includes alterations of land records, forgery of land documents, multiple allocations of the same plot of land and irregular valuation of land. This thesis investigates if blockchain could assist in this regard.

It is also evident that there are currently no systems to detect bribes and this thesis investigates whether blockchain could be such a system or whether bribes and other forms of corruption and fraud occur outside the systems. The literature review also suggested that blockchain makes it possible for land registry decentralisation while others cautioned that decentralisation does not mean it is the end of third-party authorities such as the Deeds Office. This thesis investigates whether a decentralised blockchain land registry could be achieved through PPIs. It was also argued that smart contracts may not comply with data privacy and protection laws such as POPIA. Key legislation, such as ECTA may need to be amended since the current version prohibits electronic signing of agreements for the sale of immovable property and, as such, this thesis makes policy and institutional reform recommendations.

Overall, the literature review has suggested that there is consensus that indeed blockchain could improve transparency, accessibility, auditability, security, reliability, and accountability and tests the land registry use case in the South African context to answer the main research question. This literature review chapter laid down the foundational knowledge in this field of research into land reform in South Africa, land registry governance inefficiencies, corruption and fraud, transparency and accountability, land registry decentralisation, good governance, innovation and blockchain technology including blockchain land registry pilots conducted globally.

This chapter can be cross-referenced with other chapters such as Chapter 4. The conceptual literature review around principal-agent and collective action problems can be cross-referenced with the empirical literature review around corruption and fraud. The conceptual literature review around blockchain technology innovation and digital transformation can be cross-referenced with the Chapter 2 empirical literature review around innovation and blockchain technology. Moreover, the empirical literature review around good governance can be cross-referenced with the conceptual literature review around effective governance. This thesis cross-references both the empirical literature and the conceptual literature reviews in Chapter 5, 6 and 7.

CHAPTER 3: CONCEPTUAL FRAMEWORK

The IAD framework is designed for the analysis of policy interventions and the understanding of how institutions develop (Ostrom, 2011). Coase (1937) argued that since institutions are important because they help enforce laws to reduce risks and overcome transaction costs, institutional analysis allows us to examine the distinct impact of political institutions on the ability of states to generate revenue.

Institutional analysis of the political economy of the land registry investigates the power relations and interests amongst political institutions and key private sector stakeholders or actors impacted by the land administration and management processes within the land and real estate sector. This thesis seeks to understand the current political economy by conducting land governance and land registry governance institutional analysis. The institutional analysis also assists us to understand the complex nature of corruption and fraud within various land and real estate sector institutions. Thus, the conceptual framework developed for this thesis applies an institutional analysis and arrangements together with other concepts such as public good, principal-agent, collective action problems, decentralisation, PPIs, technology innovation, digital transformation and effective governance.

3.1 Institutional Analysis and Development (IAD) Framework

Using Ostrom's (1985) IAD framework, this thesis will use the concept of institutional analysis and institutional arrangements to assess the current policies and practices and to recommend relevant policies and regulatory reforms for the adoption of a blockchain-based to deal with current inefficiencies and to assist in dealing with corruption and fraud. This thesis is concerned with the assessment and review of the current main stakeholders or actors, policies, procedures, legislation, regulations, systems, processes, and technologies that govern the . The objective is to be able to recommend the relevant policies and regulations reforms that would assist in

dealing with corruption and fraud and to support land reform through the implementation of a blockchain-based land registry.

Institutions are defined as formal and informal sets of rules that are understood and used by a community (Hess and Ostrom, 2007). Those who engage in institutional analysis seek to understand one of the most fundamental political and social questions: How do fallible humans come together, create communities and organisations, and make decisions and rules in order to sustain a resource or achieve a desired outcome? The framework is an analytical scaffolding that contains a universal set of intellectual building blocks (Hess and Ostrom, 2005). Its design allows for the detailed analysis of specific resources and situations, while being general enough to apply to multiple types of inquiries (Oakerson, 1992).

This thesis relies on the IAD framework as an analytical tool to investigate the current institutional arrangements around the and the required reforms to achieve effective governance of the as a public good. Furthermore, the IAD framework seems well suited for analysis of resources and their allocation when new technologies are developing at an extremely rapid pace and new information technologies have redefined knowledge communities (Hess and Ostrom, 2007). Moreover, new technologies have shaken up the traditional world of information users and information providers, making obsolete many of the existing norms, rules, and laws and leading to unpredicted outcomes (Hess and Ostrom, 2007).

This thesis assesses and reviews the current Deeds Office and institutional arrangements such as policies, legislatures, regulations, systems, processes, and technologies to adapt them in line with the institutional change required if blockchain technology were to be implemented or deployed. The IAD framework is also used to identify gaps in the land governance community, and to establish actions that could strengthen the with the active participation of social actors. The IAD framework is a diagnostic tool that could be used to investigate any broad subject where humans repeatedly interact within rules and norms that guide their choice of strategies

and behaviours (Hess and Ostrom, 2007). Moreover, the IAD framework identifies the main variables that should be considered when evaluating the role of institutions in the formation of social interactions and decision-making processes (Hess and Ostrom, 2007).

The IAD framework is based on the investigation of the main stakeholders involved in the decision-making process, the study of current laws at the national and local levels, and the analysis of the interactions between the stakeholders (Onate-Valdivieso et al., 2021). This thesis conducts institutional analysis of political institutions at both national, provincial, and local government such as the national DALRRD, Deeds Office, DHS, provincial government institutions such as housing departments, and local government institutions such as municipal housing departments. Institutional arrangements are defined as “the policies, systems, and processes that organisations use to legislate, plan, and manage their activities efficiently and to effectively coordinate with others in order to fulfil their mandate” (UNDP, 2016). Institutional arrangements are the organisation of policies, rules, norms, and values that countries have in place to legislate, plan, and manage the execution of development, the rule of law, the measurement of change, and other such functions of state (Rosso et al., 2014). By its nature, the issue of institutional arrangements appears in every aspect of development and public sector management (Rosso et al., 2014).

This thesis research reviews institutional arrangements involving the main institutions involved in the decision-making processes, key stakeholders involved in land reform programmes, institutions regulating professionals such as estate agents and conveyancers, current legislation or regulations governing the land administration, and management processes pertaining to the . It also analyses the interactions and interests between various stakeholders. Moreover, the framework could be used to analyse dynamic situations where individuals develop new norms, new rules, and new physical technologies (Hess and Ostrom, 2007). Institutional arrangements will allow this thesis to investigate the required reforms, new norms, and new rules to support

the implementation of the new blockchain technology by integrating it into the land registry through PPIs.

Capacity assessments frequently reveal that there is a great deal of inefficiency across government agencies because institutional arrangements are not set up in an optimum way (Rosso et al., 2014). Institutional arrangements allow this thesis to investigate the current Deeds Office capacity and to establish how the land registry could be decentralised to support land reform and assist in dealing with corruption and fraud. Furthermore, a review of institutional arrangements could explore the causes of current levels of performance and the constraints and drivers of capacity development, and through the analysis of these elements, improvements could be introduced into the system so that bottlenecks are eliminated (or reduced) and potentialities are maximised (Rosso et al., 2014). Institutional arrangements will enable this thesis to understand the current drivers of the land registry capacity development due to the current inefficiencies. Institutional arrangements also enable this thesis to understand how Deeds Office and land registry performance could be improved and how blockchain technology innovation and digital transformation could facilitate capacity-building through PPIs and achieve effective governance.

Institutional arrangements are produced only through interaction and cooperation (Onate-Valdivieso et al., 2021). The IAD framework identifies three groups of variables:

- the rules for the field of action (institutions).
 - the collective unit of interest (community).
 - the attributes of the physical environment in which the community acts
- (Onate-Valdivieso et al., 2021).

The action arena consists of the action situation and the participants (individuals or groups) involved (Hess and Ostrom, 2007). The action arena, often at the heart of the analysis, is

particularly useful in analysing specific problems or dilemmas in processes of institutional change (Hess and Ostrom, 2007). Institutional arrangements will allow this thesis to identify the current land governance challenges and issues that enable corruption and fraud within the Deeds Office and around the land registry to establish reforms around policies, regulations and processes that could strengthen the land registry as a public good by analysing social interactions and decision-making processes amongst the various actors affected by the land registry and land reform.

Institutions could thus be equipped with better instruments; improved legislative arrangements could be proposed; enhanced human resources could be created; and streamlined procedures could be adopted, among other things (Rosso et al., 2014). The knowledge commons is an appropriate place to start when trying to think through the challenges of creating a new form of commons such as a new digital repository within an organisation (Hess and Ostrom, 2007). Moreover, the new technologies that have made electronic, distributed information possible are also part of the evolving physical conditions of the knowledge commons and the nature of many digital facilities today has the capacity for digital information to be non-rivalrous, at least over time (Hess and Ostrom, 2007). The land registry database is a non-rivalrous commons and it is important to dissect institutional arrangements around it and understand its evolving conditions and how it could transition into a digital repository. The Deeds Office as an institution and the current custodian of the land registry need to be transformed. The institutional arrangements enable this thesis to identify the required legislative arrangements and required resources for the implementation and adoption of a decentralised blockchain land registry.

3.2 Land Registry as a Public Good

Institutional analysis enables this thesis to investigate the challenges of creating a blockchain technology-based land registry as a public good given the land governance key role players' power and interest and to assess how the current land registry could transition from a manual

and paper-based land registry to a digital repository. In economic theory, a public good is a good that is both non-excludable and non-rivalrous in that individuals cannot be effectively excluded from use and where use by one individual does not reduce availability to others (Wikipedia, no date). The conditions set by Samuelson (1954) for a public good are that it should be non-excludable and non-rivalrous, with some standard examples being sanitation, national defence, and lighthouses (Heilbroner and Thurow, 1998). The framework extends the notion of public goods, through Kaul's (2000) conceptualisation of public goods to being global public goods.

Public goods are also characterised by producing positive externalities. Kaul (2003) argued that public goods are goods with significant qualities of inclusiveness, i.e. qualities of being non-discriminatory and there-for-all. If they discriminate (e.g. place a special emphasis on the poor or other population groups), that discrimination should be in the interests of inclusivity, otherwise, the good might be more appropriately be classified as a club good or even a private good (Kaul, 2003).

There is a need for the land registry as a public good to be enhanced or improved so that it could become accessible to most of the population and support land reform for the restoration of justice. Moreover, both forms of corruption create distrust amongst citizens, and decrease the quality of public goods and services provided (Volintiru and Osuna, 2018). The current corruption and fraud issues around land reform enabled by current land registry inefficiencies have indeed decreased the quality and reliability of the land registry as a public good. This thesis investigates the institutional reforms required for the land registry to enhance its public good characteristics through adopting blockchain technology to address current land registry inefficiencies. The public good concept also allows for the investigation to establish if the current land registry has the necessary qualities or characteristics of a public good that could assist in dealing with corruption and fraud and help fast-track land reform programme implementation. This thesis also assesses if the land registry fulfils public good characteristics,

whether it is indeed non-rivalrous and non-excludable given the fact that all citizens have equal rights to register a title.

Inclusiveness pertains to the formal properties of the good (as opposed to its substantive properties). It could have three main origins, namely:

- a deliberate public policy decision to place or keep a good's benefits in the public domain,
- non-excludability of the good's benefits, due to economic or technical reasons, and
- inadvertent existence of a good in the public domain (Kaul, 2003).

The Deeds Registry places the land registry in the public domain for all citizens but its current form remains discriminatory. This is especially for the poor, due to inefficiencies such as the existing title deeds backlog for subsidised housing; the non-existence of title deeds for properties within communal land currently owned by the government or traditional leaders through trusts; non-existent title deeds for properties in informal settlements; high fees payable to access the land registry; and high property purchase costs due to the reliance on estate agents and conveyancers which raises the unaffordability issue for the majority. Khan (2004) argued that the key service delivery functions of the Western democratic state are to protect property rights and to deliver democratically decided upon public goods efficiently. Moreover, the service delivery model focuses on a range of services that states should deliver — in particular, public goods such as law and order, social security, and market regulation — and relies on competitive markets to deliver all other goods and services (Khan, 2008). This thesis seeks to investigate if the state, through the Deeds Office, can deliver the service of the land registry as a public good and enhance the protection of property rights for all South African citizens in an effective, efficient, and uncorrupted manner through the deployment of the blockchain technology

It is important to qualify the conceptualisation of the land registry as an impure public good. A pure public good is characterised by its non-rivalrousness and non-excludability; the use of the resource by one person does not diminish the availability of it for another person and, in its provision, no one can be excluded (Kaul, 2003). Classical examples of pure public goods are national defence and free-to-air broadcasting. If a service is classified as a public good, then it should be distributed in a way which gives everyone equal access. Samuelson (1969) argues that it is impossible to exclude anyone from using a public good and if a public good is supplied to one person, it must be equally available to everyone else. This is also true for the current land registry, which although it should operate as a public good, if an impure one, its public good characteristics are marred by it not catering for the majority of citizens because of inefficiencies such as fees payable for access, the reliance on conveyancers, and corruption and fraud. Few public goods have both these characteristics as Kaul et al. (2015) point out. If a good has only one of these characteristics, it is referred to as an impure public good (Kaul, 2015).

Public goods could create positive externalities (Stanford, 2021). The range of goods considered purely public is quite limited, whereas the number of goods that are partially non-rivalrous or non-excludable impure public goods is more extensive (Kaul, 2015). Moreover, as Kaul (2003) points out, there are in fact very few pure public goods — digital public goods, like most other public goods, are impure public goods, in that they are designed to be excludable outside of the class or function they are serving. Moreover, an impure global public good would tend towards universality in that it would benefit more than one group of countries and would not discriminate against any population or set of generations (Kaul, Grunberg, and Steyn, 1999). The electronic or digital land registry is also an impure digital public good, as it excludes citizens that do not have property or land, broadband connectivity, or mobile or digital devices. Furthermore, the land registry is an impure public good because the data and information in it are non-rivalrous and non-excludable, with general constraints on access and digital literacy. It is non-rivalrous in the sense that adding titles to the registry or viewing the registry does not

detract from the resource base, the value of the registry or the use of it by others. Viewing or use of the data on the land registry by one person does not reduce its utility. The land registry is a public instrument from which no one could be excluded. The land registry as a public good should not discriminate against any part of the population because of their geographic location. This thesis has adopted the concept of a public good in order to understand the characteristics of a public good to improve the current land registry.

According to the UN Secretary General's Roadmap for Digital Cooperation Data, public goods include open-source software, open data, open artificial intelligence (AI) models, open standards and open content that adhere to privacy and other applicable laws and best practices, do no harm, and help attain the Sustainable Development Goals (SDGs) (UNDP, 2021). This thesis investigates and reviews the relevant privacy and data protection laws so that the decentralised blockchain land registry does not exacerbate corruption and fraud and create new inefficiencies. Furthermore, the data of digital public goods supports sustainable development in multiple ways: they enable knowledge and data-sharing, reduce duplication in the development system and beyond, and play a significant role in accelerating digital transformation in low- and middle-income countries (UNDP, 2021). This thesis also looks at the land registry as a public good using blockchain technology and how it can be integrated with other systems and databases such as the DHA to verify identity documents and marriage certificates, the SARS e-filing system to verify the tax status of buyers and sellers without duplication of effort. This thesis assesses how data and information could support land reform programme implementation and assist in dealing with corruption and fraud.

3.3 Effective Governance

The contemporary focus on good governance reforms in developing countries is based on the developing market-enhancing governance capabilities of states (Khan, 2008). However, Khan (2008) concluded that good governance reforms are difficult to implement in any developing

country. Despite some critics, there is, however, some intrinsic value in governance that accepts the importance of a capable state operating under the rule of law, which is the basis of many definitions of good governance in the literature. Kaufmann et al. (2004) defined governance as:

- the process by which governments are selected, monitored, and replaced,
- the capacity of the Government to formulate and implement sound policies effectively, and
- the respect of citizens and the state for the institutions that govern economic and social interactions among them.

Effective governance could inform the required institutional reforms for the Government to achieve its land reform objectives by developing a land registry that accommodates every citizen and all forms of property. Governance is a multifaceted concept encompassing all aspects of the exercise of authority, through formal and informal institutions, in the management of the resource endowment of a state. The quality of governance is thus determined by the impact of this exercise of power on the quality of life enjoyed by its citizens (Huther and Shar, 2005). Governance may be defined as a set of values and principles which promote elements of transparency and accountability (Naidoo, 2011). Effective governance is required to promote transparency and accountability to deal with some of the corruption and fraud around land reform caused by the current land registry inefficiencies. Furthermore, a good governance system also requires that the process of decision-making and public policy formulation is transparent and accountable (Naidoo, 2011). Effective governance could bring more transparency and make the allocation process for land reform beneficiaries auditable so that the Government could better manage the land reform programme.

The effective governance concepts used within this framework to investigate, review, and assess the current land registry against adapted principles of good governance will strengthen the case for it to be used as a public good to support land reform and assist in dealing with

corruption and fraud. Drawing on Rothstein and Teorell (2008), the concepts of effective governance include democracy, the rule of law, and efficiency. Although we can argue that democracy is not a sufficient condition for quality of government, it may well be a necessary one, as it serves to set certain limits on the types of policies that may be pursued in the name of impartiality (Rothstein and Teorell, 2008).

A state that enacts apartheid-type laws, for example, cannot be seen as having a high quality of democratic government even if they are applied by ever-so-impartial bureaucrats (Rothstein and Teorell, 2008). The governing party, the ANC, has initiated land reform policy as a democratic imperative. However, the land reform programme itself has proved to be inefficient and ineffective with some public officials, traditional leaders and citizens undermining the rule of law. Quality of government requires both democracy in the access to power and impartiality in the exercise of this power (Rothstein and Teorell, 2008). Mkandawire (2007) suggests that the reason that recommended policies were implemented but the hoped-for results did not materialise was because of institutional weakness or bad governance. The current institutional weaknesses within municipalities and the Deeds Office have led to slow progress in terms of implementing land reform policy.

The new proponents of good governance have argued that the policies themselves are sound, but that good governance also means implementing orthodox economic policy. Good governance thus simply has become one more instrument for ensuring the implementation of adjustment programmes, because macroeconomic policies have been seen as sacrosanct. It was seen as important that the democratic institutions that have good governance are not used to undermine economic policy (Mkandawire, 2007). The Deeds Office requires new institutional reforms to enhance transparency, accessibility, security, auditability, and reliability that will result in effective governance of the land registry without undermining land reform policies or other economic policies around food security, for example. There is a need to investigate if the

current institutional arrangements, such as the policies, processes and procedures governing the Deeds Office and the land registry, are impartial, promote transparency and accountability.

Even the most successful anti-corruption strategies are unlikely to result in dramatic, across-the-board improvements in most developing countries, but if they are properly designed to attack the most damaging effects of types of corruption, they may still be very successful in accelerating economic development and improving the conditions of political viability (Khan, 2004). However, to investigate practically whether a blockchain land registry could support land reform and assist in dealing with corruption and fraud, this thesis adopts the concept of public goods using the United Nations' (2009) expanded definition of good governance. This defines good governance as political systems that are participatory, consistent with the rule of law, transparent, responsive, consensus-oriented, equitable and inclusive, effective and efficient, and accountable (Rothstein and Teorell, 2008; UN, 2009).

Positive Effective Governance Characteristics	Current Land Registry Public Good	New Improved Land Registry Public Good
Complete	Available to all citizens but still incomplete.	Complete land registry with all title deeds for the real estate sector.

Transparent	Currently centralised within the Deeds Office and visible mostly to Deeds Office officials, estate agencies, conveyancers, and attorneys.	Decentralised and transparent for all key stakeholders, including buyers and sellers.
Secure	Manual interventions and paper-based title deeds compromising security.	Immutable records, smart contracts and electronic title deeds to enhance security.
Inclusive	Properties within communal lands and some subsidised houses currently without secure property rights in the form of title deeds.	Inclusive and complete blockchain-based land registry maintained as a public good for all citizens.
Accessible	Fees payable to access the registry. Buyers and sellers not directly accessing the registry due to reliance on conveyancers.	Decentralised to increase accessibility for all key stakeholders to alleviate information asymmetries.

Auditable	Manual interventions and paper-based processes making transaction audits difficult.	Reliable, tamper-proof transactions with historical audit trail to provide necessary evidence to hold those involved accountable.
Reliable	Currently, land audit reports and statistics are not reliable and disputed by various stakeholders.	Reliable land audits and better management of corruption and fraud in the land reform programme.

Table 3-1: Identified positive good governance characteristics to strengthen property and land restitution.
(Source: Author's own compilation)

Pressure to reduce corruption and move towards good governance is both necessary and desirable but these ends cannot be achieved unless attention is also given to other governance capacities required for accelerating and sustaining growth (Khan, 2006). Due to the past injustice to the majority of the population previously marginalised, South Africa also needs to pursue other good governance measures such as promoting inclusiveness and equitable distribution of land in order to fast track the implementation of the land reform programme to achieve a more sustainable growth.

Despite the critiques and the shortcomings of good governance, this thesis has compiled the positive good governance characteristics informed and guided by the good governance

principles of the United Nations (2009) to address the current land registry governance inefficiencies to support land reform, and strengthen property and land management and restitution. These include inclusiveness, completeness, transparency, accessibility, auditability, security, reliability, and accountability. These characteristics of positive good governance would assist in the restoration of justice while respecting the rights of all the citizens to access to secured property and land ownership rights in a form of title deeds as articulated by Kaufmann et al. (2004). They would also bring the required transparency and accountability for effective governance highlighted by Naidoo (2011).

The adopted good governance principles allow this thesis to also investigate the suitable anti-corruption and fraud controls and controls to address the current land governance inefficiencies using blockchain technology. Given the current land governance inefficiencies, such as the backlog of title deeds, outstanding secure tenure in a form of title deeds for properties within communal land, and manual and paper-based land registry processes, these concepts of effective governance enable this thesis to investigate the required institutional arrangements and reforms that could facilitate the adoption of the blockchain-based land registry. This thesis reviews and assesses the characteristics of positive good governance of the land registry identified in this conceptual framework, informed by the good governance principles defined by the United Nations (2009) so that the land registry could support land reform. .

The contemporary focus on good governance reforms in developing countries is based on the developing market-enhancing governance capabilities of states (Khan, 2008). Khan (2008) concluded that good governance reforms are difficult to implement in any developing country. South Africa is a developing country, and this thesis acknowledges the critiques around the limitations or shortcomings when implementing good governance principles and critically assesses the current land registry against the adopted positive good principles or characteristics.

3.4 Principal-Agent and Collective Action Problems of Corruption

3.4.1 Principal-Agent Problems

Mccubbins, Noll and Weingast (1987) argued that the political control of agencies is a principal-agent problem. The best available solution typically consists of a method for altering the incentives of the agent and usually involves some mechanism for costly monitoring of the agent, combined with a system of rewards and punishments (Mccubbins, Noll and Weingast, 1987). Moreover, they argue that standard political oversight, such as hearings, investigations, budget reviews, and legislative sanctions, correspond nicely with this form of solution to a principal-agent problem (Mccubbins, Noll and Weingast, 1987). This thesis investigates whether a blockchain-based land registry could provide tamper-proof, complete, and reliable data and information that could be useful in hearings and investigations and assist in identifying potential interventions in terms of legislative sanctions as a solution to the principal-agent problem.

Principal-agent theory, which emerged in the 1970s from a number of economists and theorists, describes the pitfalls that often arise when one person or group, the agent, is representing another person or group, known as the principal (Harvard Law School, no date). The principal delegates a task to the agent, who is expected to act in the best interests of the principal (Ross, 1973). According to Forgues-Puccio (2013), principal-agent theory has strongly guided and influenced anti-corruption efforts in the last two decades. The principal-agent model assumes that agents (public officials) serve to protect the interests of the principal whether in a public, parliament, or supervisory role (UNODC, 2019). The first scholars to propose, explicitly, that a theory of agency be created, and to begin its creation, were Stephen Ross and Barry Mitnick, independently and roughly concurrently (Forgues-Puccio, 2013). Ross introduced the study of agency in terms of problems of compensation contracting; agency was seen, in essence, as an incentives problem. Mitnick introduced the now common insight that institutions form around

agency, and evolve to deal with agency, in response to the essential imperfection of agency relationships: behaviour never occurs as it is preferred by the principal because it does not pay to make it perfect (Mitnick, 2006). Mitnick (2006) further argued that society creates institutions that attend to these imperfections, managing or buffering them, adapting to them, or becoming chronically distorted by them and concluded that to fully understand agency, we need both streams to see the incentives as well as the institutional structures. This thesis's conceptual framework has also adopted the principal-agent theory also known as the agency theory, as defined by Ross (1975) to investigate the root causes of corruption between the various principals and agents affected by the land registry and land reform.

The principal-agent model, where one party supplies a bribe and the other party accepts it, could be applied to almost all corruption offences (Nurkey et al., 2021). The principals are corrupt in the sense that they are seeking services to be rendered by offering agents bribes or kickbacks (Groenendijk, 1997). There are costs and benefits for both principal and agent, and, according to Groenendijk (1997), principals have to bear the costs of failure and inspection or prevention. They must minimise the sum of these costs which could lead to penalties if corruption is exposed. The agents also bear the costs of concealment, diversion, and failure in exchange for bribes. Moreover, principals who are confronted with corruption have to minimise the sum of the costs of suppressing corruption and costs of failure while receiving the services or goods (Groenendijk, 1997).

Anti-corruption programming is overwhelmingly influenced by principal-agent theory, which depicts corruption as occurring when public officials who have discretion over the provision of public services lack accountability (Marquette and Peiffer, 2015). Klitgaard (1988) defined the equation for controlling corruption based on the principal-agent economic analysis below:

$$\text{Corruption} = \text{Monopoly} + \text{Discretion} - \text{Accountability}$$

Klitgaard (1988) argued that illicit behaviour flourishes when agents have monopoly power over clients, when agents have great discretion, and when accountability of agents to the principal is weak.

Ross (1975) argued that an agency relationship arises between two (or more) parties when one, designated as the agent, acts for, on behalf of, or as a representative for the other, designated the principal, in a particular domain of decision problem. Common examples of the principal–agent relationship include corporate management (agent) and shareholders (principal); politicians (agent) and voters (principal); and brokers (agent) and buyers (principal) (Gottschalk, 2017).

Furthermore, Mitnick (1975) presented applications of such social relationships in advisers and clients, lawyers negotiating with one another, diplomats negotiating with foreign governments and one another, the behavioural patterns of legislative representatives, the advocacy of interest groups, regulators as agents subject to policing by public observers, and regulatory incentive systems (with a specific application to the regulation of power plant siting). Rewards and punishments do not deal directly with the problem of asymmetric information. If agencies have better information, they have a range of discretionary powers that are undetectable to political overseers and, in the absence of monitoring, some non-compliance decisions would not be subject to retribution (McCubbins, Noll and Weingast, 1987).

Effective sectoral anti-corruption policies must consider the power, capabilities, and interests of relevant actors in that sector, including why they may be engaging in corruption and how they could benefit from reduced corruption and even help enforce rules (Roy, Khan, and Slota, 2022). Moreover, capability refers to how actors make money and add value, and this is important because productive actors are more likely to want to enforce rules, but they may not always have the power to block the violators and in contrast, actors with low productive capabilities may make their money by violating rules and be less interested in enforcement

(Roy, Khan, and Slota, 2022). This thesis investigates if blockchain's immutable records with reliable audit trails can limit opportunities to engage in corruption and if data and information from blockchain can encourage relevant actors to enforce the rules.

The application of the principal-agent theory is relevant to this thesis and allows for the investigations of principal-agent problems, their power, capabilities, their interests and relationships between various main stakeholders or actors affected by the land registry within the land and real estate sector. For example, buyers or sellers can become principals with estate agents and conveyancers being agents, and principals can become victims of corruption and fraud when agents decide not to act in their best interests. Other principals include subsidised housing beneficiaries with subsidised housing administrators, councillors and municipality officials as agents.

Enforcement of procedures is decentralised in that enforcement does not depend on the action of political principals and this lowers enforcement costs and preserves the influence of politicians without direct participation or explicit knowledge on their part (McCubbins, Noll and Weingast, 1987). Furthermore, Groenedik (1997), in his principal-agent model of corruption, argued that there are two principals (one of which is corrupting) and one agent (who is corrupted). The behaviour of these principals and agents is analysed in terms of the costs and benefits associated with different actions and, contrary to common belief, the use of principal-agent models is not limited to bureaucratic corruption (Groenedik, 1997). Given the types, root causes, dynamics and scenarios of corruption and fraud within land governance, this thesis has adopted the principal-agent problems concept in order to investigate, not only bureaucratic corruption within the government institutions responsible for land administration and management such as the Deeds Office, SARS, the DoJ&CD and municipal offices, to name a few, but also corruption stemming from other stakeholders such as buyers, valuers, estate agents, conveyancers and sellers.

In reality, the interests of the agents often diverge from the interests of the principal, and while the former could prescribe the pay-off rules in the principal-agent relationship, there is informational asymmetry to the advantage of the agent, which could be used for personal benefit (Groenendijk, 1997). This theory includes information imbalance, where the actions and intensity of one side could be hidden from another participant and, therefore, the agent has the power to serve their own interests (Nurkey et al., 2021). According to Khan and Roy (2019), the rule of law assumption does not consider the effects of structural power asymmetries on information asymmetry. Due to the current land registry manual and paper-based processes, the principal-agent concept assists in investigating the information asymmetries that exist between the agents and principals and how they enable corruption and fraud.

Because principal-agent theory focuses on the responsiveness of the agent's decisions to the principal's goals, and how this responsiveness is mediated by actions available to each actor as well as institutional settings in which they interact, it is a natural framework to study accountability in political institutions (Gailmard, 2012). Public accountability is a function of the capabilities of principals to judge the performance of their agents (Achen and Bartels 2002; Healy and Malhotra 2010; Lenz 2012; Lupia and McCubbins 1998). The principal-agent concept will be used to examine the current institutional arrangements to establish the root causes of corruption and fraud to ensure that there is accountability within the land and real estate sector.

3.4.2 Collective Action Problems

Principal-agent (McCubbins, Noll and Weingast, 1987) and collective action (Olson, 1965) theories provide an explanation for the persistence of corruption as not necessarily competing but as usefully complementary (Marquette and Peiffer, 2015). Olson (1965) argues that the reason rational egoists will not act in their common interest is that interest groups trade in collective or public goods which are characterised by non-excludability. Furthermore,

collective action will not take place if individuals are rational egoists, and the group is large (Olson, 1965). The study uses collective action concepts to investigate potential corruption and fraud that occurs because of collective action involving key stakeholders around the land registry processes.

Principal-agent theory has been proposed in combating corruption by several authors (Rose-Ackerman 1978; Klitgaard 1988); however, their works rely on older technologies and some ideas have to be changed in accordance with the era of digitalisation (Nurkey, Kosherbayeva, Yedilkhan and Kuandykov, 2021). The collective action theory goes beyond traditional principal-agent relationships and emphasises the importance of factors such as trust and how individuals perceive the behaviour of others (UNODC, 2019). Persson (2013) claims that the reason anti-corruption policies have failed to tackle systemic corruption is because they have been based on the principal-agent theory. It is implicitly assumed in this theory that there are honest principals; this may not be the case (UNODC, 2019). This thesis also uses the collective action theory to investigate if there is also systemic corruption and fraud around the land registry.

Persson, Rothstein and Teorell (2013) regard systemic corruption as a collective problem, because people rationalise their own behaviour based on the perceptions of what others will do in the same situation. Most anti-corruption strategies assume that the people formally charged with taking action — the enforcers — will do so when the information or analysis arrives and in contrast, where corruption is widespread, and most people and organisations are breaking some rules some of the time, this is a problematic assumption even when violations are detected and accountability procedures exist that enforcement often does not follow (Roy, Khan, and Slota, 2022).

People are aware of the negative consequences of widespread corruption, but they engage in corrupt actions as they believe that "it doesn't make sense to be the only honest person in a

corrupt system" (Marquette and Peiffer, 2015). Within the land registry political economy, because there are many stakeholders and processes involved in order to successfully transfer property and obtain a title deed, the collective action problems concept assists in investigating possible systemic corruption and collusion among various stakeholders.

In such an environment, anti-corruption measures based on the principal-agent model will not be effective, as there are no "principled principals" who will enforce anti-corruption norms (Klitgaard, 2004; Persson, Rothstein and Teorell, 2013). An institutional or organisational culture of corruption leads to the normalisation of corrupt practices at a societal as well as individual level, and to impunity for violating or ignoring formal anti-corruption rules (Appolloni and Nshombo, 2014). To combat corruption in these circumstances, there is a need for collective and coordinated approaches, such as reform coalitions or proactive alliances of like-minded organisations (UNODC, 2019). Collective action concepts also allow them to investigate the adoption of a blockchain technology innovation which will facilitate the decentralisation of the land registry to increase transparency and promote accountability. The collective action concept further allows for possible public-private interplays to be scrutinised to establish if there is an opportunity for reform coalitions between the Deeds Office and other state departments such as the Department of Human Settlements and various municipalities or alliances of like-minded organisations within the real estate sector such as banks, professional bodies, and law enforcement agencies to tackle systemic corruption.

A logical conclusion from both principal-agent and collective action is that more effective monitoring and sanctioning could increase accountability and reduce corruption (UNODC, 2019). ICT, by the power of its capacity to control, trace, report, examine, and distribute enormous quantities of information, may encourage nations to identify and detain criminals, and prevent ultimate fraud (Nurkey et al., 2021). Both the concept of principal-agent and collective action problems will enable this thesis to investigate if a blockchain land registry could provide the necessary controls for effective monitoring with evidence in the form of data

and information to hold both principals and agents involved in systematic corruption due to collective action problems to account. Moreover, the principal-agent and collective action problems lens allows this thesis to investigate if blockchain technology could deal with information asymmetries between the principals and the agents within the land and real estate sector. Furthermore, institutional analysis will enable this thesis to also investigate the current principal-agent problems and collective action problems to understand the power relations and interests among various actors within the land and real estate sector in order to propose the required institutional reforms to deal with the current land governance inefficiencies and to promote transparency and accountability required to protect citizens' property rights and the interest of all key stakeholders.

3.5 Blockchain To Enable Effective Governance (Land Registry Decentralisation)

The matters of hierarchy, bureaucracy, authority, power and corruption are ongoing problem topics in organisational theory and in policy analysis. DAOs make a difference precisely in these areas (Baleitti, 2021). Hsieh (2018) defines DAOs as non-hierarchical organisations that perform and record routine tasks on a distributed, cryptographically secured, public ledger; and that rely on the voluntary contributions of their internal stakeholders to operate, manage, and evolve the organisation through a democratic consultation process. Moreover, Hsieh (2018) found in his research study that interview data reveals that DAOs coordinate tasks through machine consensus and social consensus mechanisms that operate at varying degrees of decentralisation.

The Deeds Office and the land registry are currently faced with the same challenges, which are the root cause of some of the current land reform implementation failures. Moreover, the current Deeds Office mandate and the conveyancers mandate as per the DRA limit the decentralisation of the land registry. New institutional arrangements are required to enable the Deeds Office and

land registry to be decentralised. Land registry decentralisation could empower key stakeholders with the necessary autonomy so that they would not have to rely only on the Deeds Office and conveyancers in terms of managing the land registry, processing deeds transfers and title deeds registrations. This thesis investigates if the Deeds Office could remain as the regulator but share the responsibility of the land registry with other institutions such as municipalities and banks with interest and more influence on the conveyancing process. Land registry autonomy through decentralisation could also introduce more transparency which could assist in dealing with some corruption and fraud issues. Blockchain could increase transparency, security, and accountability so that decentralisation does not enable more opportunities for corruption and fraud. However, a traditional organisation operates on contracts, and, unlike smart contracts, these contracts cannot execute their terms themselves and need third parties, i.e. human involvement, to be interpreted and enforced (Baleitti, 2021). A DAO is a blockchain-based system that enables people to coordinate and govern themselves mediated by a set of self-executing rules deployed on a public blockchain, and whose governance is decentralised, i.e. independent from central control (Hassan, De Filippi, 2021).

Hassan and De Filippi (2021) highlighted the following distinctive characteristics of a DAO:

- DAOs enable people to coordinate and self-govern themselves online. Although no mention is made of the minimum size of the group, the term organisation is generally understood to refer to an entity comprising multiple people acting towards a common goal, rather than a legally registered organisation. The concept of decentralisation has allowed this thesis to investigate institutional arrangements for possible suitable participants drawn from the current stakeholders, especially institutions with power and interests to protect the interests of the rest of the population, particularly those who are the beneficiaries of land reform, for the establishment of the decentralised blockchain land registry as a public good.

- A DAO source code is deployed in a blockchain, like Ethereum, with smart contract capabilities, arguably always a public blockchain. However, the deployment of blockchains like Ethereum cannot be a plug-and-play for the land registry use case, because cryptocurrencies are different from property rights and, for this reason, this thesis also investigates a suitable blockchain deployment model for the land registry to facilitate decentralisation without assuming a public blockchain deployment model as it is the case with cryptocurrencies.
- A DAO's smart contract code specifies the rules for interaction among people, although it is unclear to which extent there may be other governance mechanisms that could affect or overrule such code. Using the decentralisation concept, this thesis conducts institutional analysis and explores the possibility of using smart contracts to enact certain agreements between stakeholders within the real estate sector and to eliminate the opportunity for corruption and fraud.
- Since these rules are defined using smart contracts, they are self-executed, independently of the will of the parties. Through the decentralisation concept, this thesis investigates institutional arrangements and examines whether current policies and regulations could support and enable this innovative feature of smart contracts and do away with paper-based agreements while still serving and protecting institutional power and interests.
- DAO governance should remain independent from central control. This thesis conducts analysis of institutions and critically reviews the role and responsibilities of the Deeds Office with its current sole mandate to manage the land registry and its impact on other institutions' power and interest should the mandate be extended to other institutions keen to be part of the administration. This takes into account the dynamics of the land and real estate sector, and the better functioning of a decentralised blockchain land registry as a public good.

- Since they rely on a blockchain, DAOs inherit some of its properties, such as transparency, cryptographic security, and decentralisation. These properties are at the core of this research study to investigate if indeed the properties or positive externalities of a public good could assist in dealing with corruption and fraud.

In contrast with the traditional understanding that organisational innovation is enabled by technology, this thesis will argue that blockchain technology cannot be successfully implemented unless organisational participants are organised in a decentralised and autonomous manner (Hsieh, 2018). Blockchain is a foundational technology that foreshadows significant economic, technological, and organisational change (Iansiti and Lakhani, 2017). Tracking transactions between entities is a core organisational task and blockchain has reconceived this tracking function from private and centralised to public, decentralised and potentially programmable (Hsieh, Vergne, Anderson, Lakhani and Reitzig, 2018).

By way of example, Bitcoin, the most commonly known application of blockchain technology, represents a partial substitute for banks, albeit with notable differences. Firstly, at an aggregate level, traditional banks store transaction histories in a centralised fashion, users only view their personal bank statements and must trust that their information is protected from both cyber-attacks and employee misconduct. Secondly, traditional banks employ clerks to process payments. Human agents are prone to agency problems which could lead to misconduct, such as theft. Human agents are also expensive. With Bitcoin, all transactions are recorded publicly and electronically onto the immutable blockchain and stored in a distributed fashion across thousands of network nodes. As a result, records are easier to maintain, and cyber-attacks are less likely to succeed (because transaction information is not held in one central location). Blockchain technology provides multi-site copies of ledgers, which are essentially aggregations of past transactions (similar to a bank account statement). The technology also provides encryption to validate transactions (similar to the personal security devices used in online

banking), which generate a unique transaction-specific signature based on a personal key (Hsieh, 2018).

This thesis conducts analysis of institutions within the land and real estate sector to identify potential stakeholders that could become participants in a decentralised blockchain land registry for it to function as public good for the benefit of the majority. This thesis investigates the required institutional reforms to transform the current Deeds Office mandate by decentralising the land registry so that other political institutions and other private sector key stakeholders with interest in the land registry can also play a role in the administration of the land registry as a public good through PPIs.

But, as *The Economist* (2015) points out, blockchain technology has far-reaching applications beyond cryptocurrency and payments; in fact, blockchain-based organising and the resulting DAOs have the ability to replace centralised intermediaries in other applications requiring complex coordination such as asset-ownership tracking, trade financing, digital identity provision, supply chain traceability, and more (*The Economist*, 2015). This thesis investigates if the Deeds Office could relinquish its current centralised mandate to regulate and manage the land registry so that other institutions with vested interests could participate and influence the policies and regulations governing the land registry.

The framework supports the investigation into blockchain to establish if it could facilitate and enable decentralisation and further strengthen the land registry as a public good. This thesis also investigates whether the government could continue having authority through the Deeds Office and continue policies that would create institutional arrangements that would allow for better coordination of the processes for the land registry in a decentralised environment. This thesis also conducts institutional analysis around the political institutions or government institutions such as the Deeds Office, DALRRD, DHS, the Office of the Valuer, SARS and DHA to name a few, and private sector institutions such as the banks, third-party commercial

service providers such as Lightstone and SearchDeeds with interests, power and influence on land administration and management policies, procedures and processes within the land and real estate sectors.

Hassan and De Filippi (2021) concluded by highlighting some of the misconceptions and unresolved issues in the discussion around the DAO and, at the same time, providing an, and understanding of what DAO means for the land registry. They argue that, first, with regard to the decentralisation of a DAO, it is unclear whether decentralisation needs to be established only on the infrastructural layer (i.e. at the level of the underlying blockchain-based network) or whether it also needs to be implemented at the governance level (i.e. the DAO should not be controlled by any centralised actor or group of actors) (Hassan and De Filippi, 2021). This thesis seeks to investigate if decentralisation will result in the death of the Deeds Office or if the Deeds Office will continue to play a role and what that new role could be after the recommended institutional arrangements.

Secondly, it is unclear whether a DAO must be fully autonomous and fully automated (i.e. the DAO operates without any human intervention whatsoever), or whether the concept of autonomy should be interpreted in a weaker sense, (i.e. while the DAO, as an organisation, may require the participation of its members, its governance should not be dependent on the whims of a small group of actors) (Hassan and De Filippi, 2021). This thesis conducts analysis of institutions to establish a possible and viable decentralisation governance model enabled by blockchain technology.

Hassan and De Filippi (2021) argued that, thirdly, there are some debates as to when the community of actors interacting with a smart contract could be regarded as an actual organisation (independent of any legal recognition). For instance, it is unclear whether the mere act of transacting with a smart contract qualifies as an organisational activity, or whether a

stronger degree of involvement is necessary, such as having a governance model or collective interactions amongst participants (Hassan and De Filippi, 2021).

Governments play an important role in the economy in their attempts to diminish the inefficiencies associated with many kinds of market failure and the same information problems can hamper a government seeking to use taxes, subsidies, or prohibitions to improve on the market outcome (CoreEcon, no date). Market failure models interpret collective choice in terms of the aggregation of individual choices, so it interprets collective actions as the aggregation of individual actions (Kay, 2017). Moreover, the market failure approach directs our attention to secondary issues of information asymmetry and fails to recognise the more fundamental reasons—the primacy of collective decisions and collective action (Kay, 2017). According to Kaul et al (1999), the solution to market failures and collective action problems is often to bring in the state to improve conditions for cooperation by, among other things, establishing new or clearer property rights, setting norms and standards, or providing fiscal incentives. In some cases, the coercive power of government produces socially optimal outcomes, and, in many other instances, the state plays an essential catalytic role. In order to deal with the current land reform failures, particularly failure to provide land registry access to the majority of the population and inadequate transparency and accountability in dealing with corruption and fraud, this thesis assesses and evaluates the decentralisation of the current Deeds Office and the land registry through PPIs through the Deeds Office ensuring that there are socially optimal outcomes. This thesis investigates if decentralisation can achieve social optimal outcomes whereby the land registry is accessible by and serves the rest of the population. Depending on the purpose of the organisation, the code defining a DAO may need to be supplemented by individuals or organisations that provide services that the DAO cannot do itself (Kaplan, 2021).

Other experts believe DAOs could be seen as distributed organisms, or distributed internet tribes, which live on the internet and exist autonomously, but also rely heavily on specialist individuals or smaller organisations to perform certain tasks that cannot be replaced with

automation (Blockchainhub, 2019). On decentralisation, cross-country regression analysis that includes both advanced and developing countries developed by Gurgur and Shah (2000) reported that decentralisation has a significant effect in reducing corruption (Khan, 2004).

Despite some of the negative decentralisation empirical evidence to deal with corruption, this thesis revisits the current institutional arrangements through an a legal and document analysis of the relations between the state (in the form of the DALRRD, which is responsible for the Deeds Office and the land registry) and the end users (corporate and private citizens) of the registry. It does so by examining the mandate, roles and responsibilities of the Deeds Office and seeks to investigate the new reforms that could facilitate decentralisation so that decentralisation could strengthen the land registry as a public good. Together with the triangulated data from the high-level interviews, the coded information informed an institutional analysis to understand the underlying power relations and interests that determine policy and implementation outcomes.

3.6 Blockchain Technology to drive Land Registry Innovation, Digitalisation, Digital Transformation and Digital Literacy

Digital innovation could be defined “as the creation of (and consequent change in) market offerings, business processes, or models that result from the use of digital technology” (Nambisan et al., 2017). Henares (2014) argued that an innovative public sector is necessary to provide better and more efficient services and help to deal with societal challenges. Public sector innovation is a multi-dimensional effort, and technology plays a crucial role in the generation and dissemination of innovation in government. The internet and other digital technologies have proven to be powerful enablers of innovation, changing the way governments innovate. Governments should harness the power of digital technologies to be able to adapt and respond efficiently and effectively to challenges and demands coming from people (UNECE, 2017). Furthermore, the usual view of an innovation process as based on the hierarchical

structure of public organisations, decided by higher authorities, implemented by middle-level authorities and staff, with citizens playing the role of beneficiaries only, is useful and somewhat valid but still incomplete and generally wrong (Henares, 2014).

This thesis undertakes the assessment and review of the land registry pilots based on blockchain technology innovations that have already been conducted by other developing and developed countries, so as to evaluate and assess how blockchain has facilitated innovation around land governance and what institutional arrangements are required that would enhance the land registry as a public good.

According to Nurkey et al. (2021), all ICT tools and technologies that are used to fight corruption could be classified into two broad categories:

- These tools are supposed to automate processes and services, transfer traditional services online, encourage online reporting, and generate the ability to provide information, including complaints, online. With the processes carried out online with the state, as well as with the analysis of the most vulnerable places and their automation, the risk of corruption could be significantly reduced (Nurkey et al., 2021).
- The tools assist in analysing the available historical information regarding transactions with government participation and searching for suspicious information within them (Nurkey et al., 2021).

The conceptual framework enables this thesis to investigate the potential of blockchain technology innovation to digitise the current land registry services in line with the new reforms of institutional arrangements so that the land registry could become available online with historical tamper-proof transactions, and data and information that could be used as evidence when investigating corruption and fraud.

Rigid bureaucracies are mentioned in studies on public innovation as a barrier to innovation, since they do not allow for the experimentation and trial-and-error processes needed for successful innovation implementations to emerge (Bekkers and Tummer, 2018). Innovation not only refers to values like efficiency and effectiveness, but also relates to responsiveness, trust and, thus, the appropriateness of the innovations that are being pursued (March and Olsen, 2010). The concept of technology innovation allows this thesis to investigate whether blockchain innovation and its applicability to the land registry could change the way the Deeds Office and the land registry currently work beyond just efficiencies and effectiveness and could facilitate more collaboration and inclusivity among stakeholders.

3.7 Blockchain Enhancing E-Government and Driving Innovation Within the Public Sector

The United Nations Economic Commission for Europe (UNECE) (2017) called for inclusive governance and argued that e-government has contributed to public sector reform by digitising and simplifying procedures for a mainly passive customer. However, Web 2.0 assumes an active citizen who wants to be engaged in increasing government performance. In order to cope with these expectations, we need a new paradigm (collaborative governance) and corresponding rules of engagement (Citizen Vision 2.0). Some of the e-government services have also been implemented at both national and local government in South Africa but more still need to be done as more services are still rendered using traditional methods. Challenges affecting the acceleration of e-government in South Africa include the high cost of data, limited broadband connectivity in remote areas and poor digital literacy especially for the citizens that reside rurally or within townships and informal settlements. More can be done to expand e-government services in South Africa and the land registry is one use case whereby a collaborative governance with active citizens can be achieved.

To further enhance the land registry as a public good, this thesis investigates the new institutional arrangements that would enhance the non-rivalrous and non-excludable characteristics, including the power relations between key actors or stakeholders that could drive innovation so that citizens at large would be engaged in the processes of property transfers and title deeds registration instead of relying only on estate agents and conveyancers.

E-government needs, first of all, to shift focus from service delivery to other public tasks, such as political decision-making and societal inclusion (UNECE, 2017). Secondly, it should be reinvented from the point of view of what is erroneously termed the end user but is essentially the start user: the e-Citizen (UNECE, 2017). Although there are still land governance inefficiencies affecting service delivery in terms of land reform, e-government can enhance the land registry to be more inclusive and accommodate all property market segments and make other political decision-making around land reform more transparent. Hanares (2014) suggested that a factor that drives and enables public innovation includes pressure for improvements and reforms: e.g. citizens' evaluation of government performance, emerging and changing laws and regulations, societal changes, and technological and scientific developments. Furthermore, even though the literature highlights the role of policy authorities and law and regulation reform as drivers for public innovation, their effect on service innovation was found to be modest (Hanares, 2014) and innovation within the Deeds Office can empower citizens by securing their property rights.

This thesis analyses key land governance institutions that are currently working in silos, contributing to land governance inefficiencies, inaccessible by some of the populations, some with same powers and mandates often resulting in duplication of efforts such as the Deeds Office that has the sole mandate to manage and regulate the land registry; DHS which is also driving land reform programmes at a national government level with less transparency and accountability, with unreliable land reform records that can be easily manipulated or altered, and also running its own land governance processes which are currently not efficiently

integrated with other key institutions ; The Office of The Valuer, which is responsible for conducting valuations on state-owned land and properties; and municipal housing departments, which are also driving land reform programmes at a local government level. It does this to investigate if blockchain technology innovation can bring about the much-needed new institutional reforms with increased accessibility, transparency, accountability, inclusiveness, security, reliability and auditability of the land registry as a public good. Henares (2014) concluded that public innovation is a complex process where many factors play a role, and which does not follow only one path within implementing organisations; it is a process in which agents external to implementing organisations have a fundamental participatory role. The technology innovation lens provides this thesis with an opportunity to investigate whether blockchain technology innovation, with its capabilities around decentralisation, security, immutability, auditability, and smart contracts, could help to enhance the land registry public good by improving the identified positive good governance characteristics, such as inclusiveness, completeness, transparency, accessibility, auditability, security, reliability, and accountability. The blockchain technology capabilities assessment also allows this thesis to investigate if blockchain can drive innovation, accelerate digital transformation and digitalisation by also promoting digital literacy to enhance land registry governance. The technology innovation lens also allows this thesis to review and draw lessons from some of the blockchain land registry pilots that have already been conducted and documented in both developed and developing countries, including South Africa.

3.8 Public-Private Interplays for Better Property and Land Management and Restitution

Lack of financial resources, low skill levels and limited government capacity are some of the main obstacles faced in the pursuit of e-government initiatives (Kaliannan, Awang and Raman, 2010). PPI concepts will assist with the investigation to understand the required institutional

arrangements such as the required resources, skills, and expertise from both the public and private sector to facilitate the delivery of the blockchain-based land registry as a public good.

Furthermore, according to the International Finance Corporation (IFC), public-private partnerships (PPPs) are a tool that helps governments leverage the expertise and efficiency of the private sector, raise capital, and spur development; they also help to allocate risk across the public and private sectors to where it could be managed best, and ensure that resources are distributed equitably in addressing the most urgent development needs. A PPP is a contractual agreement between public sector agencies and private sector entities for developing a public facility, product, or service by sharing resources, skills, competencies, risks, and rewards (Narasimhan and Aunghe, 2014). InfoDev's Institute of Public-Private Partnerships (2009) suggested that the policy objectives for PPPs for e-government projects could include: improved efficiency in the delivery of public services or the performance of public administrative procedures; expanded access to public services and to public information; greater transparency and reduced corruption through improved access to public information; improved quality of service by both measuring and achieving key performance indicators; reduced costs in the delivery of public services or the execution of public administrative procedures; the transfer of key risks away from the public sector's limited resources and onto the private party that could best manage them; maximising value for money through reduced costs and lower risks to the public sector; and improved competitiveness of the overall governance and economic framework. Through the process of creating strategic e-government scenarios built around PPPs, various kinds of success could be shared by the partners (Bennett and Howard, 2007). Moreover, success in these terms could mean changing the ways the government works and creating more satisfied citizens; success also means building technology capacities to enable developing nations to compete more effectively in the world economy (Bennett and Howard, 2007).

The NDP states that infrastructure investment as a percentage of GDP has needed to grow from 21% in 2015 to 30% by 2030, and this requires the public and private sectors to work together to fund and build infrastructure. National Treasury also argued that greater use of PPP financing could contribute to better decision-making, discipline, accountability and rigour in the planning and assessment of infrastructure projects (National Treasury, 2017).

According to critics of PPI, Falch and Henten (2015), a PPP is a government service or private business venture, which is operated through a partnership of government and one or more private sector companies. Moreover, Falch and Henten (2015) argued that PPIs are a broader concept than PPPs as it also includes collaborations in schemes without any form of contractual obligations. Kaul, Grunberg, and Steyn (1999) argued that markets are good at providing private goods but, for the provision of public goods, mechanisms such as cooperation are needed. Non-state actors often complement the actions of state actors, and the contributions demonstrate that the state is indeed dependent on the support of both business and society in order to provide common goods and services (Tosun, Koos and Shore, 2016). The concept of co-governance is well-suited to capture the relationships between state and non-state actors (Tosun, Koos and Shore, 2016). By identifying the resources and competences brought into the interplay between public and private actors, the rationale behind the deployment of the network and the interaction among local governments, incumbents, technology providers and service providers may be understood (Nucciarelli et al., 2010). Responses to public service challenges are increasingly co-created, with users first and foremost, but also with social and technological innovators. These enterprises, associations and groups challenge the traditional modes of public service delivery through the solutions they develop, the flexibility they bring, and the new models they invent (UNECE, 2017). Governments worldwide appear to be experimenting with new forms of horizontal governance, such as PPPs (Osborne, 2000; Hoge & Greve, 2005), interactive decision-making, stakeholder involvement (McLaverty, 2002; Edelenbos & Klijn, 2006) and other forms of citizen involvement (Lownes, 2001). These would allow the

government to drive innovation and the adoption of blockchain technology through the Deeds Office to enhance and address the current collaboration among various key stakeholders through PPIs that need to be investigated if they could address some of the current land registry inefficiencies and potentially assist with some of the corruption and fraud issues. This thesis investigates the required PPIs that could facilitate the piloting of the blockchain-based land registry for a proof of concept and identify the required resources before embarking on a full-scale implementation. This investigation also analyses potential institutions interests, each institution's capacity and capabilities and their specific interests in the land registry and what contribution they can make in the public-private interplay for the delivery of the blockchain based land registry.

Furthermore, critics of PPPs have called for a more interactive approach. Jensen (2019) argued that if a PPP implies the purposeful application of collaborative governance, then the alternative term public-private interaction (PPI) removes the assumption that all partners are fully equal and that, rather, decision-making processes are collaborative and consensus-oriented. A PPI removes the need for contractual obligations normally found in most PPP settings. PPIs allow this thesis to investigate whether inclusive PPIs could form the basis of suitable institutional arrangements involving both public and private sector stakeholders such as the Deeds Office, SARS, the CIPC, municipalities, private sector stakeholders such as banks, conveyancers, estate agents, and citizens, to provide necessary resources and infrastructure for the deployment of a decentralised blockchain land registry public good.

Public-private collaboration on public service delivery or delivery of public goods could improve transparency and accountability in delivering government services but also, at the same time, enhance the efficiency and effectiveness of the services provided (Kaliannan, Awang and Raman, 2010). Gebrihet and Pillay (2021) argued that the stakeholders need to become more functional, efficient, mutual, and proactive to ensure their activities work in a holistic and coordinated manner that will bring about positive changes in dealing with land

matters. A PPP project usually implies a contractual relationship between a public sector agency and a private company (Barroso and Feijoo, 2010). However, public authorities could facilitate ICT development without engaging in such a relationship and, in that case, the concept of PPI may be a more useful concept to apply (Barroso and Feijoo, 2010). Although the South African National Treasury has developed a PPP framework to facilitate and deliver projects or public goods, this thesis investigates new PPIs rather than the institutional arrangements associated with traditional PPP.

Gebrihet and Pillay (2021) further argued that stakeholders should stop levelling accusations and allegations at each other and work collectively to enhance land governance. This thesis also investigates the suitable PPIs to enable and support the decentralised blockchain land registry administration network with potential key stakeholders, such as municipalities, banks, and third-party service providers, to increase transparency, accessibility, auditability, security, reliability, and accountability.

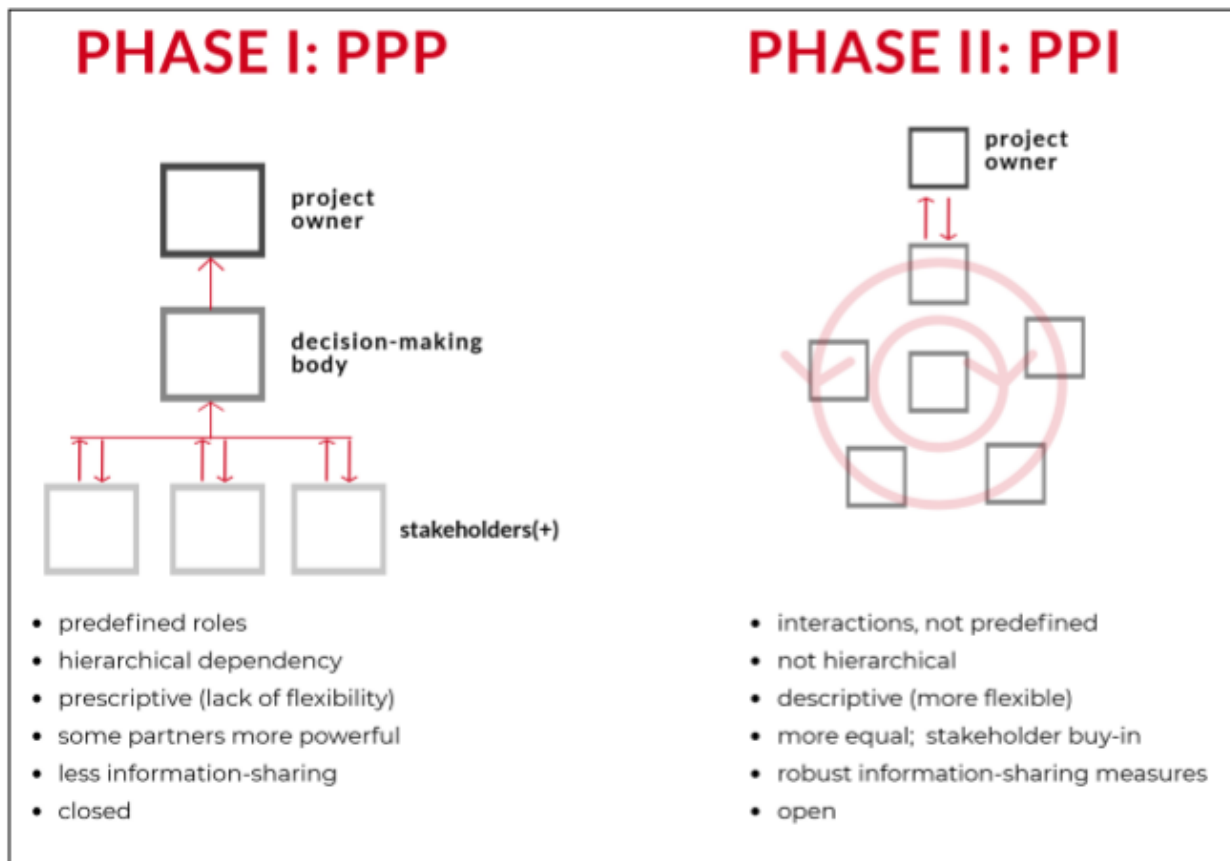


Figure 3-1: Depiction of the Evolution of Collaboration in Mauritius, 2017. (Source: Research ICT Africa, adapted from Mauritius National Cybercrime Strategy)

PPIs span a broader set of relationships that are not upheld exclusively in one specific sector. While PPPs demand contractual obligations for viability, PPIs do not, and for the ICT sector in general, PPIs are often more suitable than PPPs as they allow better interaction and flexibility between the public and private sectors (Research ICT Africa, 2018). Figure 3-1 depicts the advantages and benefits of adopting PPIs over the traditional PPPs which require no predefined roles for the participants and no hierarchy with equal importance for all, and offer more flexibility, with open and transparent processes which allows for robust information sharing (Research ICT Africa, 2018). The PPI model leverages much smaller state-operating

expenditure, as opposed to large amounts of capital, while creating incentives for private sector investment (Gillwald, 2017). Already practised by commercially operated fibre companies in South Africa, the open-access logic of this commercial model is that the operator needs to get as much traffic as possible on its network in order to maximise the return on its investment and reduce debt in order to raise new financing (Gillwald, Rademan and Esselaar 2016). This thesis investigates PPIs that could deliver a secure decentralised blockchain land registry without the need for contractual obligations and large initial amounts of capital.

Although a blockchain land registry project may not require the same magnitude of capital as broadband infrastructure projects, it does similarly require the technological and skills injection. This thesis investigates possible PPI models for the blockchain land registry implementation that could include private sector organisations in collaboration with the government through the Deeds Office. Public-private policy needs to create an enabling environment for the leveraging of private-sector investments that deliver public services and that will create the conditions for competition and innovation (Gillwald, 2017). This thesis investigates what arrangements between institutions are required to facilitate the necessary collaboration between the public and private sectors to drive the innovation required to modernise and enhance the current land registry as a public good.

In spite of these and other cases that exemplify PPI in the expansion of Next Generation Networks (NGNs) both Barroso-Gomez and Feijoo (2010) and Falch and Henten (2010) concurred that it is too early to evaluate the effects of intervention policy and to assess which mode of interplay would turn out to be the most effective. Furthermore, although PPIs have recently been practised in other ICT infrastructure projects such as the broadband infrastructure roll-out, the PPI model is yet to mature and still has to be monitored closely to measure the successes and failures compared to the traditional PPP models. As Gillwald (2018) pointed out, PPPs in telecommunications infrastructure have not been as successful as the development banks had hoped. More flexible PPIs that do not require cumbersome state procurement and

operational frameworks have, however, proved successful in other areas requiring state and private sector coordination, such as cybersecurity (Gillwald, 2018; Oolun and Van Der Spuy, 2018). This research investigates whether institutional arrangements allow for a more flexible interplay between the public and private sector that would be more inclusive, transparent, accessible, auditable, secured, and reliable and the potential of a decentralised blockchain solution for the land registry to achieve this outcome.

3.9 Blockchain to Drive Innovation, Digital Transformation, and Digitalisation

Digital transformation in the public sector is not merely transforming analogue and manual tools to digital tools, but a broad organisational transition towards new tools, policies, work processes and operations (Bjerke-Busch and Aspelund, 2021). One of the digital transformation objectives within the Deeds Office should be to increase accessibility, transparency, accountability, inclusiveness, security, reliability, and auditability of the land registry as a national asset and public good so that every citizen can benefit. Digital transformation refers to processes whereby organisations continually engage in digital innovation to develop or improve products, services, and business models; since new products and services may require different types of resources and work procedures from those associated with old products and services, organisations also need to create deeper change in their operational structures to support new forms of value creation and capture in digital transformation (Skog, 2019). Digital transformation is the adoption of digital technology by a company; the common goals for its implementation are to improve efficiency, value, or innovation (Wikipedia, no date).

Digital transformation in the public sector is a strategic necessity for governments around the world due to the growing speed with which disruptive digital technologies are changing every aspect of society and life (Nachit, Jaafari, El Fikri and Belhcen, 2021). Using the digital transformation lens, this research identifies the power relations and interests in the Deeds Office

and the current underlying culture, policies, regulations, processes, systems, and technologies arising from the current arrangements between government, represented by the NALRRD, the Deeds Office and the different stakeholders within the land and real estate sector, to establish the required institutional arrangements with the aim of securing and optimising the land registry. The digital transformation lens will enable the Deeds Office to adopt and implement blockchain technology to automate the current manual and paper-based land registry processes.

Table 1 – Digital Transformation Goals

Perspective	Objective
Social	Foster the development of a more innovative and collaborative culture in industry and society
	Change the education system to provide new skills and future orientation to persons so that they can achieve excellence in digital work and society
	Create and maintain digital communication infra-structures and ensure their governance, accessibility, quality of service and affordability
	Strengthen digital data protection, transparency, autonomy and trust
	Improve the accessibility and quality of digital services offered to the population
Economic	Implement new and innovative business models
	Increase income generation, productivity and value addition in economy
	Improve the regulatory framework and technical standards

Table 3-2: Digital Transformation Goals (Source: Ebert and Duarte, 2018)

Digital transformation is about deploying disruptive technologies to increase productivity, value creation and social welfare (Ebert and Duarte, 2018). Digital transformation for a land registry as a public good should rather focus on both social and economic outcomes for the benefit of all citizens. Emerging digital technologies such as cloud computing, mobile

computing, extended reality, AI, and distributed ledger technology require and enable business model innovations (Nambisan et al., 2017). According to Ebert and Duarte (2018), digital transformation goals, from a social perspective, are to strengthen the land registry public good. This thesis investigates if the digital transformation of the Deeds Office and land registry could facilitate the necessary change management, change the Deeds Office's current institutional mandate as the regulator and the only single custodian of the land registry, and adopt decentralisation processes enabled by blockchain so that other institutions with interest in the land registry can also participate in the administration of the land registry. Digital transformation would enable the Deeds Office to train and reskill their current employees, other key stakeholders, and employees of other state departments affected by the land registry. Furthermore, digital transformation could strengthen the land registry, as argued by Ebert and Duarte (2018), by reducing access costs, increasing access for the rest of the population, and enhancing governance characteristics such as transparency, accountability, inclusiveness, completeness, security, reliability, and auditability.

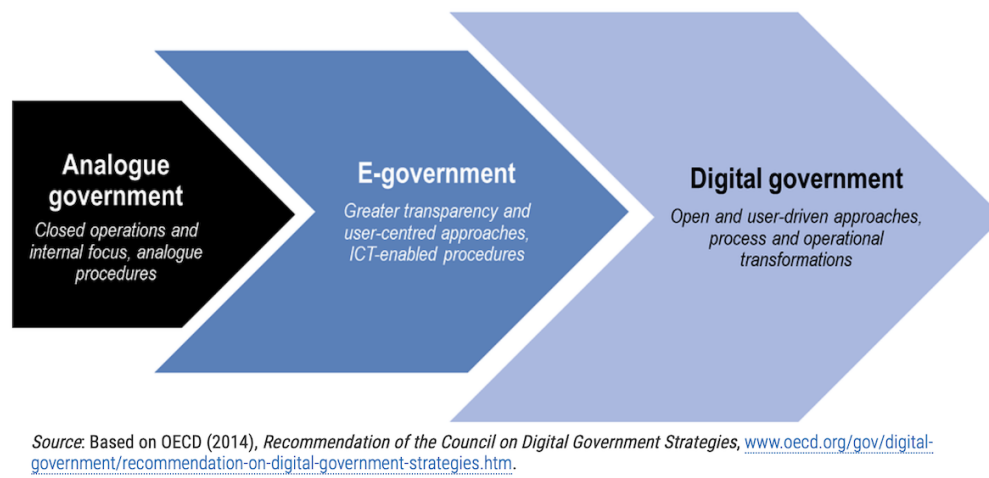


Figure 3-2: Digital Government (Source: OECD (2014))

The OECD (2018) described digital transformation in the public sector as “a shift from e-government, or the digitization (sic) of paper-based business and service-delivery processes, to a ‘digital by design’ re-engineering of services and processes, and it requires governments to take a user-driven approach, empowering citizens, and businesses to interact and collaborate with the public sector to determine and address their own needs”. This thesis investigates if digital transformation within the Deeds Office could facilitate the adoption of a distributed ledger blockchain technology to digitise the current manual and paper-based land registry processes and eradicate delays in processing property transfers and deeds registration that may also enable corruption and fraud.

Implementation of e-government is seen as a tool to improve government service delivery to citizens, businesses and within government agencies; and the benefits could be more transparency, greater convenience, less corruption, revenue growth and cost reduction (Kaliannan, Awang and Raman, 2010). According to Persson (2007), the private sector has many choices of applications and technologies to support e-business and due to the continual improvement in ICTs, these applications and technologies help the public sector to implement valuable e-government innovations and support their business processes.

The World Bank (2004) recommended the following goals for an e-government initiative:

- Promoting civic engagement by enabling the public to interact with government officials and vice versa.
- Promoting accountable and transparent governments in which the opportunities for corruption are reduced.
- Promoting greater access to government information and activities.
- Promoting development opportunities, especially the sorts that benefit rural and traditionally underserved communities.

According to the World Bank e-government handbook (2002), e-government is not a magic tool to solve all the problems of corruption and inadequacy, although it could bring change and demonstrates new ways to improve organisational processes. This is why e-government has become a priority for developing countries. Moreover, e-government is a way to share information and deliver services, the result being to reduce corruption, costs, and time, and to increase transparency and revenue (Bhatnagar, 2002).

To reduce corruption successfully, ICT-enabled initiatives generally must move from increasing information access to ensuring rules are transparent, applied to building abilities and to track the decisions and actions of government employees. (Bhatnagar, 2003). Abdulbaqi (2016) highlighted some of the social factors such as resistance to change from government employees; some were against transferring to the digital system because they saw that it was a threat to them and could cause loss of jobs and power; others resisted because the e-government project had the potential to terminate corruption. It is important to both use technologies that are widely deployed to provide a broad base of technology access. However, there is also often a substantial need to provide training, and engage in the testing of usability, functionality, and accessibility to ensure the broadest possible ability to participate in e-government services and resources (Bertot, Jaegar and Grimes, 2010). Digital transformation does not focus on only adopting blockchain technology; this thesis will investigate how the Deeds Office could facilitate change management, and training and reskilling of parties affected by the change. The resulting benefits of e-government could be less corruption, increased transparency, greater convenience, revenue growth, and cost reductions (Moatshe, 2014). Transparency and accountability help to reduce and prevent corruption, through better policy outcomes, and effective and efficient management of the public sector (Bhatnagar, 2003).

Generally, it could be argued that one of the intentions of e-government is to discourage frequent interaction of people with government servants, which in turn helps to minimise potential for corruption (Shah, 2007). Moreover, apart from learning basic ICT skills, it is

argued by socio-technical scholars that computerisation in institutions helps to control corruption and nepotism in public service delivery (Mahundu, 2015). Noruwana (2015) argued that efficiency, effectiveness, accessibility, and accountability to citizens are of paramount importance in a growing democratic country; using ICT along with other reforms, governments could deliver a wide range of services in a manner that is timely, efficient, economical, equitable, transparent, and corruption-free.

ICTs could reduce corruption by promoting good governance, strengthening reform-oriented initiatives, reducing the potential for corrupt behaviours, enhancing relationships between government employees and citizens, allowing for citizen tracking of activities, and monitoring and controlling behaviours of government employees (Shim & Eom, 2008). Transparency and the right to access government information are now internationally regarded as essential to democratic participation, trust in government, prevention of corruption, informed decision-making, the accuracy of government information, and provision of information to the public, companies, or journalists (Cullier & Piotrowski, 2009; Mulgan, 2007; Quinn, 2003; Reylea, 2009a; Shuler, Jaeger, & Bertot, 2010). The internet has greatly reduced the cost of collecting, distributing, and accessing government information (Roberts, 2006). As a result of these capacities, recent years have seen trends toward using e-government for greater access to information and for the promotion of transparency, accountability, and anti-corruption goals (Anderson, 2009; Cullier & Piotrowski, 2009; Fuchs, 2006; Shim & Eom, 2008). ICTs offer countries a new approach to creating transparency and promoting anti-corruption (Bertot, Jaegar and Grimes, 2010). Many nations with transparency laws have directly tied the implementation of these laws to the implementation of ICT-based initiatives, often through e-government (Relly & Sabharwal, 2009).

The extent to which ICTs could create a culture of transparency and openness is unclear; however, initial indications are that ICTs could in fact create an atmosphere of openness that identifies and stems corrupt behaviour (Bertot, Jaegar and Grimes, 2010). Digital

transformation is thus less about technology, and more about the way technology is used to change work practices (Dunleavy, 2006). Bertot, Jaegar and Grimes,(2010) concluded that in order to ensure long-term success in terms of transparent and open government, governments must consider creating and investing in collaborative pilot projects and targeting initiatives, projects, technologies and countries to serve as pilots. For overarching transparency, initiatives could serve as fertile test beds; the strategies of many international organisations indeed include large-scale transparency goals and objectives. Supranational and regional organisations could consider cross-national pilot projects and sharing of best practices, while collaboratively testing technologies, approaches and projects on a smaller scale would enable nations to work in tandem to develop solutions that could be scaled up and implemented to meet strategic objectives.

We live in a highly divided and inequitable world where some actors are more influential than others in setting public policy agendas and where the same goods, even supposedly public goods, are more easily accessible to some people than others (Kaul, Grunberg, and Steyn (1999). The digital transformation lens enables this thesis to investigate how the Deeds Office could drive innovation by implementing blockchain technology and facilitating the necessary change management that caters for the needs of all impacted stakeholders, including citizens at large.

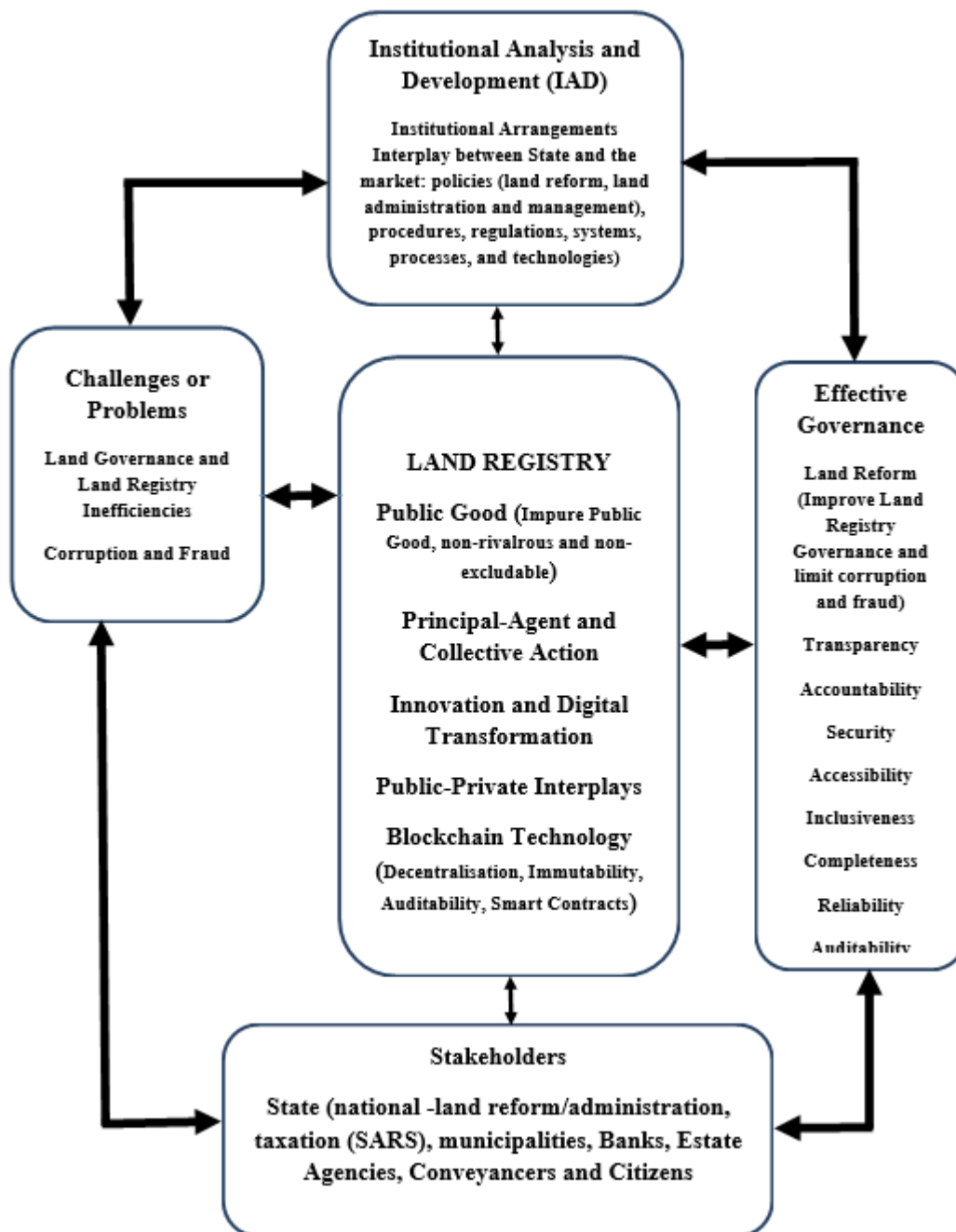


Figure 3-3: Conceptual Framework (Source: Author's own compilation)

The conceptual framework depicted in Figure 3-3 provides a lens through which to identify, analyse and assess the current challenges or problems, institutions, policies, legislation, regulations, systems, processes, technologies, social interactions, interests, and power relations or decision-making by various stakeholders or actors that govern the land registry and land reform programmes.

This institutional analysis includes a review of land administration and management processes but focussing on land registry governance, land reform and how the land registry challenges the issues and limitations that enable corruption and fraud.

The concept of effective governance as part of the framework assists in aligning the required institutional arrangements or reforms to strengthen the current land registry to support land reform and assist in dealing with corruption and fraud. The principal-agent problems concept forms part of the institutional analysis, investigating how the current land registry inefficiencies enable corruption and fraud, identifying stakeholders or actors either as principals or agents in order to recommend anti-corruption and fraud reforms around the land registry and the adoption of a blockchain-based land registry.

Public goods are distinguished from other goods through their non-rivalrous and non-exclusionary characteristics. Few goods are pure public goods. A pure public good is best explained by the lighthouse analogy cited by Coarse (1974), the use of which does not diminish the availability for use by anyone else. While public goods are provided with light by the lighthouse, no one else can be excluded from seeing the light (Coarse, 1974). Most public goods are considered impure public goods, in that they might not fulfil both requirements; in the digital world, their non-exclusionary potential often has to be regulated. Goods fulfilling these characteristics tend to make significant inputs downstream and warrant regulation to safeguard their public value. In fulfilling the characteristics of non-rivalry and non-exclusion, the administration of the land registry needs to ensure that mismanagement, corruption, and fraud

do not undermine access for the purpose of legitimate registration of land titles or for the public perusal of the registry. Neither of these characteristics diminishes the land registry as a common national resource or its use by anyone else. The application of the concept of public goods to the land registry allows this thesis to propose ways to ensure that the land registry as a public good could provide all citizens in the country with an affordable access to the registry through decentralisation and transparent mechanisms that allow for greater accountability.

To dissect the current institutional arrangements, inefficiencies, challenges, issues and limitations, the concepts of decentralisation, PPIs, blockchain technology innovation, digital transformation, and effective governance are used to find feasible solutions, policies, and regulatory reforms to guide the implementation and the adoption of the blockchain-based land registry. This conceptual framework enables an evaluation and assessment of the current land registry policies, processes, systems, and technologies to apply positive effective governance characteristics to enhance and improve the land registry as a public good. The framework enables mapping of the outcomes of effective governance to enhance and improve the land registry as a public good. This thesis's research questions and the main research objective (for the land registry as a public good to support land reform) help fast-track the implementation of government land reform programmes and assist in detecting and preventing some of the corruption and fraud.

The concept of decentralisation specifically provides guidelines to investigate how blockchain technology innovation could eliminate a single point of failure and increase further transparency and accessibility. The concept of decentralisation also allows the assessment and thorough critique of the current role of the Deeds Office and conveyancers, and their relevance in a decentralised environment.

The blockchain technology innovation lens assists this thesis in terms of understanding how blockchain as an ICT could be adopted to address some of the current inefficiencies by enabling

and supporting the Deeds Office and land registry decentralisation, to introduce corruption and fraud mitigation controls, and to increase transparency, accessibility, auditability, security, reliability, and accountability.

The concept of PPIs enables investigation into the required institutional arrangements in terms of how the Government could collaborate with other private sector institutions within the land and real estate sectors to pool resources such as skills, expertise, and infrastructure, to deliver a blockchain-based land registry as a public good. In order for the Government through the Deeds Office to drive the successful implementation and the adoption of blockchain technology innovation, this thesis has adopted the digital transformation lens to identify change management programmes, which support new institutional arrangements and reforms, and guidelines which facilitate change management amongst stakeholders, through redefining the roles and responsibilities of those affected by the change, redesigning the organisational structure and processes to reflect the new changes, training and re-skilling of the existing Deeds Office employees, and training of end users on the new decentralised blockchain-based land registry.

It is important to remember that corruption is a symptom of poor governance and focusing excessively on corruption and neglecting the complex task of reforming governance systems is a common mistake that has to be avoided (Forgues-Puccio, 2018). To help transform the Deeds Office and the land registry, understanding the relevant institutional arrangements, such as stakeholders, legislation, processes, procedures, systems, and technologies, enables this thesis to map them against other adopted concepts, such as decentralisation, PPIs, blockchain technology innovation and digital transformation, to realise the outcomes of effective governance. The conceptual framework is designed to assist with the analysis of this case. The IAD framework provides an overarching conceptual framework whereby other concepts such as public good, PPIs, effective governance, decentralisation, innovation and blockchain are linked or connected for this thesis to investigate how challenges and issues with current policies,

legislatures, technologies and social interactions within the land and real estate sector enables the current land registry governance issues. Public good concepts complement and supplement effective governance concepts which is what this thesis seeks to achieve by enhancing the land registry public good and governance. Innovation concepts complement blockchain and decentralisation so that the Deeds Office can attain good governance. PPIs link or bring together blockchain concepts in terms of capabilities and decentralisation by also driving innovation through digitalisation, digitisation and digital transformation, which requires interplays and collaboration between key public and private institutions.

3.10 Conclusion

This chapter explored a number of key concepts used to construct the conceptual and analytical framework for this thesis. The conceptual framework looks at the institutional arrangements to unpack the current challenges or problems identified in the main research question, namely, land governance and land registry inefficiencies. In order to address the research questions, this framework adopts the concepts of public good, principal-agent and collective action, decentralisation, PPI, blockchain technology innovation and digital transformation. This conceptual framework enables the dissection of the current land governance issues and inefficiencies, and their root causes. The conceptual framework demonstrates how the land registry as an impure public good, non-rivalrous and non-excludable, could support land reform for the restoration of justice to the majority. The framework outlines the positive effective governance characteristics that could support land reform and anti-corruption and anti-fraud activities, namely, inclusivity, transparency, accessibility, auditability, security, reliability, and accountability. Innovative application of blockchain technology within the context of wider digital transformation assists in terms of understanding blockchain capabilities, such as decentralisation, immutability, auditability, and smart contracts, which could address the current land registry governance inefficiencies.

On the other hand, the digital transformation concept affords an opportunity for this thesis to understand how the Deeds Office could drive innovation and change management through digitalisation by implementing blockchain technology. The framework also adopts the PPI lens to investigate suitable public and private sector stakeholders to provide the required resources and skills needed to drive the implementation and the adoption of blockchain for the decentralisation of the land registry.

CHAPTER 4: RESEARCH METHODOLOGY

This chapter outlines the methodology adopted for this thesis and how it has been applied in the selection and collection of relevant data, documents, and information, and in the analysis and interpretation of the findings. This thesis is conducted through a multi-disciplinary perspective, combining theoretical concepts of both political economy and information technology. The aim is to unpack the land governance issues, and land registry inefficiencies and issues in relation to issues of corruption and fraud within the land and real estate sectors in South Africa. This thesis will also assess whether and how shifting towards a digital land registry addresses the current land registry inefficiencies, assists in dealing with aspects of corruption and helps grow the digital economy in South Africa. This study also generates knowledge on how to adopt an innovative blockchain technology to deal with socio-economic issues central to property and land management and restitution that negatively affect the land reform programme. The generated knowledge could be used practically and adopted by policymakers and practitioners seeking to support land reform and deal with land registry governance issues within the real estate sector.

In order to do the institutional analysis, document analysis involving key role players with a special focus on legal analysis was undertaken, high-level interviews were undertaken and triangulated to understand the current land registry governance issues and challenges in the system, and technical experts interviewed to assess the potential of blockchain to remedy the problem. This thesis employs the desk research (literature review, for theoretical and conceptual understanding and secondary empirical evidence; followed by the document, legal, regulatory, and media analysis to provide multiple perspectives informed by the research questions) to be able to identify or confirm the main challenges, issues and limitations around the land registry including the key institutional stakeholders. This thesis adopted a snowball sampling method to gather and select the relevant interviewees with information, knowledge, and expertise

around the land registry. Following the interviews, this thesis transcribes the recorded interviews and applies coding to derive and confirm themes. The IAD analytical framework is adopted to analyse the data and produce the findings, recommendations, and conclusion for this thesis.

It does so also by scrutinising and assessing the current Deeds Office structures, processes, policies and procedures and other land administration and management processes and stakeholders that interface with the Deeds Office and the land registry, and reviews the capabilities of blockchain technology. This thesis also assesses and analyses the blockchain land registry pilots already conducted in South Africa and in some developed countries and other developing countries. It also investigates various stakeholders in terms of how they engage or interface with the land registry and their expectations regarding the transformation of the Deeds Office and the land registry itself to address current governance inefficiencies. This will allow this thesis to identify the current gaps and the mapping or alignment of blockchain capabilities with the main objective of supporting the land reform and to assist with enhancing property and land management and restitution.

4.1 Research Approach and Methodology

This thesis has adopted a use-case research methodology that makes use of both primary and secondary sources, while focusing on qualitative data and analysis. Moreover, qualitative data and analysis provides empirical evidence of the causes of various land registry governance inefficiencies and how blockchain could be best deployed to assist in dealing with some of the corruption and fraud elements. Multiple sources are used to gather evidence for the case, including desktop research, document analysis and in-depth interviews with selected key institutions and other key stakeholders within the real estate sector. Primary data is collected through semi-structured interviews and recorded for transcription using Microsoft Teams and Zoom communication software programs. This thesis follows a set of structured questionnaires

with open-ended questions. Secondary data was sourced using mainly desktop research of websites, newspapers articles, media releases and official documents released by some of the key stakeholders. Target institutions and individual interviewees were carefully sampled and selected based on their potential to provide data and information that would assist in answering the research questions. The areas of focus during interviews were mainly concentrated on topics related to land registry inefficiencies in the real estate sector in South Africa.

What was raised were governance issues within the real estate sector, around land reform and how they enable corruption and fraud; the Deeds Office and land registry policies, processes, and systems; and the appropriate technologies to understand how the Deeds Office and the land registry could be modernised through digital transformation, focusing on addressing inefficiencies and putting controls in place to help deal with corruption and fraud.

The study exploration was in the context of the broader political and social economies of South Africa, enabling the development of a South African case showing whether and how a secured decentralised blockchain land registry via PPIs could potentially support land reform by enhancing property management and land restitution. The case study helps explain both the process and outcome of a phenomenon through complete observation, reconstruction, and analysis of the cases under investigation (Tellis, 1997).

Case studies provide an opportunity for the researcher to gain a deep holistic view of the research problem, and may facilitate describing, understanding, and explaining a research problem or situation (Tellis, 1997). To conduct an assessment and analysis of existing systems, processes, policies, regulations and technologies, this thesis conducts analysis of the political and social economies within the real estate sector and the land reform programme focusing on corruption and fraud. This was to gain greater understanding of the research problem, current land registry inefficiencies, causes of the current inefficiencies, weaknesses and loopholes within the land administration and management processes, and the feasibility of a decentralised

blockchain land registry use case to assist in dealing with some of the inefficiencies. As the capacity of the state to implement the technology was already identified as a barrier, PPIs were explored as a mechanism to overcome the problem to introduce the required skills and resources.

The case study approach allows various sources and data collection methods to reveal, build and clarify information around land registry inefficiencies, corruption and fraud, as well as the feasibility of the decentralised secure blockchain land registry as a public good through PPIs (University of Melbourne, no date). Good case studies use a number of different research tools to increase validity; for example, one could use both qualitative and quantitative approaches and different data collection instruments, such as expert interviews, documentation reviews and artefact collection. Interviewing was this study's primary technique for gathering empirical data using semi-structured interviews. Semi-structured interviews were considered for selected institution representatives, government officials, professionals and blockchain technology solutions service providers. In-depth, high-level interviews were conducted with some of the public officials who work at the Deeds Office, as well as blockchain technology solutions providers, key stakeholders such as estate agents, conveyancers and institutional stakeholders within the real estate sector who are affected by the land registry, such as BASA, PPRA, and the Office of the Valuer. High-level interviews were also conducted with other key organisations with keen interest in the efficient functioning of the land registry, property management, land restitution and land reform and the eradication of corruption and fraud within the real estate sector, such as Corruption Watch. In addition, CAHF, as an organisation with a keen interest in the low-income property market and driven and created mainly by the land reform programme in South Africa, was also interviewed.

A case study could be carried out by using either qualitative or quantitative evidence or a combination of both types of evidence (Gerring, 2007) but this research focuses on qualitative evidence. Imas (2009) has described the case study as a method of learning about a complex

phenomenon through extensive description and analysis of that instance in its contextual settings. A case study could be defined as an intensive study of a person, a group of people or a unit, which is aimed to generalise over several groups or units. In a case study, the focus is on a special unit (Jacobsen, 2002) with context as crucial (Yin, 2003). The context for this study is the land registry inefficiencies, corruption, and fraud within the real estate sector in South Africa, and the potential for modernising the Deeds Office and the land registry system through innovative blockchain technology.

Even within a single case, a researcher is able to analyse the data both within each situation and across situations (Yin, 2003). This case study will investigate how a decentralised blockchain land registry created through PPPs could introduce the necessary transparency, skills, and capacity to assist in dealing with corruption. The reason for selecting a case study approach is that the study seeks to make key policy and regulatory recommendations around the Deeds Office mandate and the land registry in South Africa that depend on broader issues of digital policy and data governance.

The researcher must identify the specific audience of the study and, therefore, also understand their specific needs (Yin, 2009). Stakeholder analysis within the real estate sector was used to understand the context and identify the different parties involved, as well as their interests and influence. Institutional analysis also assisted with better understanding the key formal laws and regulations related to land, and the informal rules that govern land administration and management in South Africa. Using stakeholder and institutional analyses, the study identified key stakeholders (agents) central to the Deeds Office and the land registry to understand their specific challenges, issues, concerns and needs regarding corruption and fraud.

Secondary documentation analysis was conducted to understand existing and required policies, regulations, suitable PPI models, and suitable blockchain deployment models. The questionnaires for the blockchain service providers were formulated around the strengths,

challenges, and limitations of blockchain technology, such as immutability, scalability, accessibility, high maintenance costs, data protection and privacy and information confidentiality, so that these could be factored into the analysis when making recommendations.

Due to sensitivity around land corruption and fraud matters, the study employs the snowball sampling technique to identify potential interviewees such as lawyers, sales agents, and property and land valuers. All interviewees were guaranteed full anonymity due to the sensitivity of the information around some of the inefficiencies such as corruption and fraud. The first-round analysis was done through the coding of data with each individual assigned a number and preserving their anonymity. The study paid special attention to a blockchain technology use case for effective public governance around the land administration and management, taking into account the current challenges and limitations of blockchain technology.

4.2 High-Level Semi-Structured Expert Interviews

An expert interview is a qualitative semi-structured or open interview with a person holding ‘expert knowledge’ and it is a method often used in policy analysis, be it as part of a more comprehensive set of methods or as a stand-alone method (Van Audenhove et al., 2019). This thesis has adopted expert interviews as a stand-alone method. The final number of expert interviewees was adequate and the institutional interviews for the selected key institutions within the real estate sector provided sufficient coverage to unpack the land governance issues and land registry inefficiencies in line with the research questions. Key institutional expert interviewees included interviewees from the Deeds Office, Corruption Watch, BASA, LPC, PPRA and CAHF. The necessarily diversified views within and about land governance and the land registry, along with other views from key stakeholders such as blockchain technology solutions providers, were very useful for the study, allowing the research questions to be addressed and the findings to be verified through triangulation. The individuals identified for

interviews included some of the Deeds Office officials, professionals such as a conveyancer, an estate agent, and a subsidised affordable housing administrator. The semi-structured expert interviews with open-ended questions made it possible for interviewees to share their knowledge of and experience of land registry governance and introduce new perspectives to support the generation of knowledge between the researcher and participants. This was a very helpful method to gain perspectives, views, and experiences from various participants.

Unlike structured interviews that contain a defined sequence of questions to be asked in a similar manner of all interviewees, the distinctive characteristic of semi-structured interviews is that they have a flexible and fluid structure (Priyadarshini, 2020). Moreover, semi-structured interviews are usually prepared around a supporting interview guide that includes areas, topics or themes needing to be covered during the interview. The typical aim is to allow flexibility in how and in which order questions are asked, and how certain topics might be followed up and advanced with other interviewees (Priyadarshini, 2020).

The interview protocol was designed to begin with introductions, detailing the background of the study and the objectives of the research. This provided detailed information for the interviewees about the purpose of the study and, as part of the introduction, for the interviewees to understand the context and scope of the study. Some expert interviewees were senior in the sense that they play roles such as Chief Executive Officer (CEO), Director and General Manager; however, for the sake of anonymity, these were all recognised as ‘Senior Managers’ in order to hide identity due to the sensitivity of the research study. The land registry is central to most of the land administration and management processes and selected interviewees were from institutions or were individuals with keen interest in the land registry and the eradication of the current inefficiencies within the land and real estate sectors.

4.2.1 Consent

Participants were asked to sign a consent form, giving permission for the interviewer to record the interview, and to use the data and information shared during the interview. More than one interview was conducted within The Deeds Office in order to obtain different views and perspectives as empirical evidence, depending on the role and responsibilities of the officials in the Deeds Office as it is the current custodian of the land registry in South Africa. The Deeds Office officials selected for the interviews included officials at executive management level, officials responsible for deeds registration, lodgement and examination, and interviewees with knowledge of current land governance, property management, land restitution, land reform issues and most importantly the current land registry inefficiencies. At every stage of the process, data and information were treated and stored confidentially and anonymously due to sensitivities around corruption and fraud inefficiencies.

4.2.2 Expert Interviews Transcription

In the case of qualitative data, the analysis commences during the data collection phase itself (Rocks et al., 2007). The overall analytical approach adopted for the interview transcripts was template analysis, whereby the researcher produced a template that represented themes identified in the documented data (King, 2004). Analysis of the interviews as a primary data was based on the identified themes informed by the literature review and the conceptual framework namely the land governance issues and land registry inefficiencies, land reform issues in relation to the land registry, decentralisation, technology innovation, PPIs, and digital transformation literature as a framework. Identified themes from the transcribed interviews facilitated the analysis of inter-relationships of effective governance through innovation enhancing transparency, accessibility, inclusivity, security, auditability, reliability, and accountability.

4.3.3 Tools Used to Conduct Expert Interviews

The expert interviews for the study were conducted over Zoom and Microsoft Teams online communication software programs. The recorded interviews were transcribed and coded manually using Microsoft Word and Microsoft Excel tools.

4.3 Document Analysis

Secondary data was collected through the document review process, by analysing data from a variety of secondary sources including real estate sector legislation, Deeds Office documents and reports, subsidised housing programme documents and reports, and documents and reports on blockchain land registry pilots conducted so far. The document analysis focused on the current land registry governance and inefficiencies within the real estate sector, existing land registry processes, blockchain capabilities for the land registry use case, blockchain limitations, key stakeholders, challenges and limitations within the current land registry systems and processes, and the current real estate sector regulatory landscape in relation to the land registry. The study relied on online documents only.

4.4 Validation

An often-identified drawback of a single-case design is its inability to provide a generalisable conclusion across a number of cases. However, Yin (2009) makes the case for a convincing single case through the building of a rich narrative on the basis of strong evidence and analysis, which this thesis seeks to do in particular when events are rare. One way to overcome this is by triangulating the study with other methods in order to confirm the validity of the process (Zainal, 2007). The findings from qualitative evidence were verified, and data collected was coded and then triangulated through other sources such as document analysis, news sources, interviews with stakeholders such as civil society and not-for-profit organisations (NPOs)

dealing with land corruption and fraud, such as Corruption Watch in South Africa and the PPRA which deals with some of the property management issues.

4.5 Coding

The study's main research method was the open-ended interviews which required thorough interrogation and dissection through coding. Interviews were transcribed into text to enable coding and data analysis thereafter.

To analyse the data gathered from the interviews, coding was adopted to dissect qualitative data from the interviews conducted. Coding is the process of labelling and organising qualitative data to identify different themes and the relationships between them. Coding in its most basic form is the simple operation of identifying segments of meaning in your data and labelling them with a code, which could be defined as “a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldana, 2015).

Central to qualitative analysis, coding reduces large amounts of empirical material and makes data readily accessible for analysis, while at the same time increasing the quality of the analysis and findings (Linneberg and Korgaard, 2019). Coding is not just labelling, it has a linking function and leads from data to the idea (Richard and Morse, 2007). Thematic coding involves “interpreting the information” and categorising textual extracts with reference to “themes in the context of a theory or conceptual framework” (Boyatzis, 1998).

Miles, Huberman, and Saldana (2013) argued that findings and results do not emerge from your transcripts and documents by themselves but require deliberate work to identify the most important elements and write them up into a coherent and convincing story that answers the research questions and provides insights that are loyal to the data. Furthermore, Miles, Huberman, and Saldana (2013) suggested that, while coding, you make judgements about each

individual element in your data in order to decide whether it is relevant or not. This reduces the amount of data you have to take into the final analysis and makes the analytical tasks easier. If you are doing a comparative study or have multiple interviews, coding provides you with a structure that allows comparison of specific dimensions of interest. Showing the data to the reader forces you to develop a chain of evidence depicting your arguments and showing how you have reached your conclusions (Pratt 2009).

Questions asked initially could change throughout the research process, especially in inductive approaches (Charmaz 2014), so reconciling the chosen question(s) and answer(s) is ultimately necessary. Moreover, as a result, through the dynamic development of codes, we come to understand participants' views and actions from their own perspectives (Charmaz 2014).

First, a set of research questions and a research design were established. The objectives and the research question are important, as they help to define which type of data is needed in order to complete the project successfully by answering a particular question, as well as serving as an arbiter in respect of any questions that appear during the research process (Linneberg and Korgaard, 2019). Regardless of the data, it is important to document them in a format that makes them accessible for labelling, so they are visible and retain their form over time (Linneberg and Korgaard, 2019). Expert interviews were coded and analysed in line with the following issues, informed by this thesis's research objectives and the research questions:

- Land reform in South Africa
- Land governance issues and land registry governance inefficiencies
- Forms and causes of land registry governance inefficiencies within the real estate sector
- Elements of corruption and fraud
- Manual and paper-based processes
- Reduced transparency and accessibility due to centralised deeds lodgement and the deeds transfer processes being mainly driven by conveyancers

- Subsidised housing title deeds backlogs
- Insecurity of tenure and absence of title deeds for communal land properties and properties within the informal settlements
- High costs of buying and selling property, transfer of property and title deeds registrations
- Delays in processing title deeds
- Decentralisation of the Deeds Office and the land registry
- Blockchain's value proposition to address land registry inefficiencies to support land reform, property and land restitution
- Possible PPIs to provide the necessary skills and resources for the implementation and the adoption of blockchain
- Possible policies and regulations to facilitate digital transformation to implement a blockchain-based land registry

4.6 Validation Through Triangulation

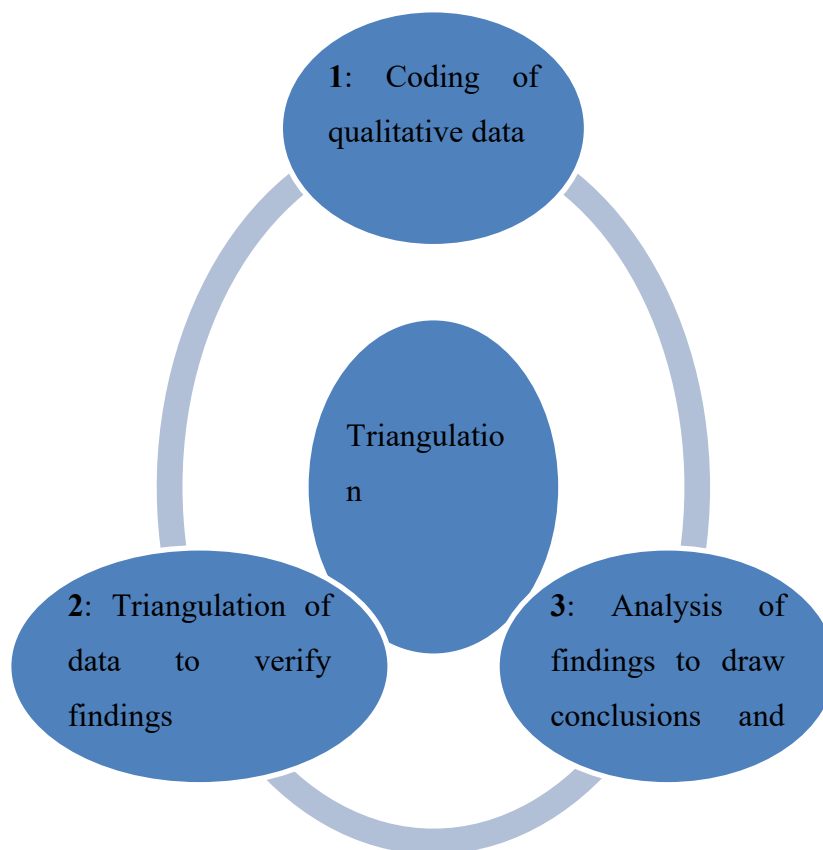


Figure 4-1: The triangulation process (Source: Author's own formulation)

To present empirical evidence, data must be compared with existing literature and analysed as a dialogue between data and theory (Yin, 2009). When codes are clustered together according to similarity and regularity, patterns are born, and the connections between them can be analysed. This also implies identifying concepts inspired by the relevant theoretical framework during this process. Both theories and extant empirical work play yet another role in data management, as chosen categories can be compared with their relations with relevant theories

or concepts from previous studies, to validate or generate further ideas for the analysis. This is sometimes referred to as theoretical triangulation (Miles, Huberman, and Saldana 2013). Through triangulation, different responses to the same question and secondary data were analysed to obtain necessary insights or findings to inform the answers to the research questions, draw conclusions and make recommendations. Triangulation was used to verify findings identified through the coding of qualitative data. Findings were triangulated with different data sources: interviewees, and other sources, such as documents. The triangulation process was conducted in an iterative manner, starting with coding qualitative data to produce findings; followed by triangulation of data to verify findings; and then analysis of findings to draw conclusions and recommendations, repeating the same process as new findings emerged from the coding process.

4.7 Limitations in Conducting Research

It was easy to gain access to the selected institutions and institution representatives and other interviewees within the real estate sector. However, there were some challenges and limitations experienced in conducting the study due to its sensitivity around corruption and fraud:

- Although interviewees admitted that corruption and fraud exist within the real estate sector, there were no official statistics in terms of the number of corruption and fraud cases dealt with that could be shared to conduct quantitative data analysis for the study.
- Information around corruption and fraud cases is largely confidential unless the outcomes of certain cases have been made available to the public.
- Most of the selected institutions do not maintain a database to record corruption and fraud incidents, complaints, or occurrences.
- The study relied only on the information publicly available around land governance and land registry governance inefficiencies.

The reliance on qualitative primary and secondary data was also a limitation, in the sense that interviews reflected the interpretation and the opinions of only those who have been interviewed. To avoid biases as a result, this was mitigated by triangulating different sources of data and information, and testing perceptions, opinions, views and claims against other available qualitative and quantitative data.

Data Collection Method	Description	Total
Expert Interviews- Public Institutions	Deeds Office, City of Johannesburg-Department of Housing	5
Expert Interviews- Private Institutions	Pam Golding, STBB, 71Point4, Seso Global, Chromaway and Lightstone	8
Expert Interviews- Not for Profit Institutions	Corruption Watch, Banking Association of South Africa, Property Practitioners Regulatory Authority, Centre for Affordable Housing Finance in Africa, and Legal Practice Council of South Africa	7

Document Analysis – Key Laws	Land governance key laws in South Africa since 1994	20
Documents Analysis – institutions processes, policies, structures and technologies	Various online Documents from the Deeds Office, Department of Agriculture, Land Reform and Rural Development, Department of Housing, Urban Land Mark, Property Professionals, Deeds Web, Windeed, Searchworks and mydeedsearch	Online documents from 9 institutions

Table 4-1: Different Methods Used (Source: Author’s own compilation)

4.8 Conclusion

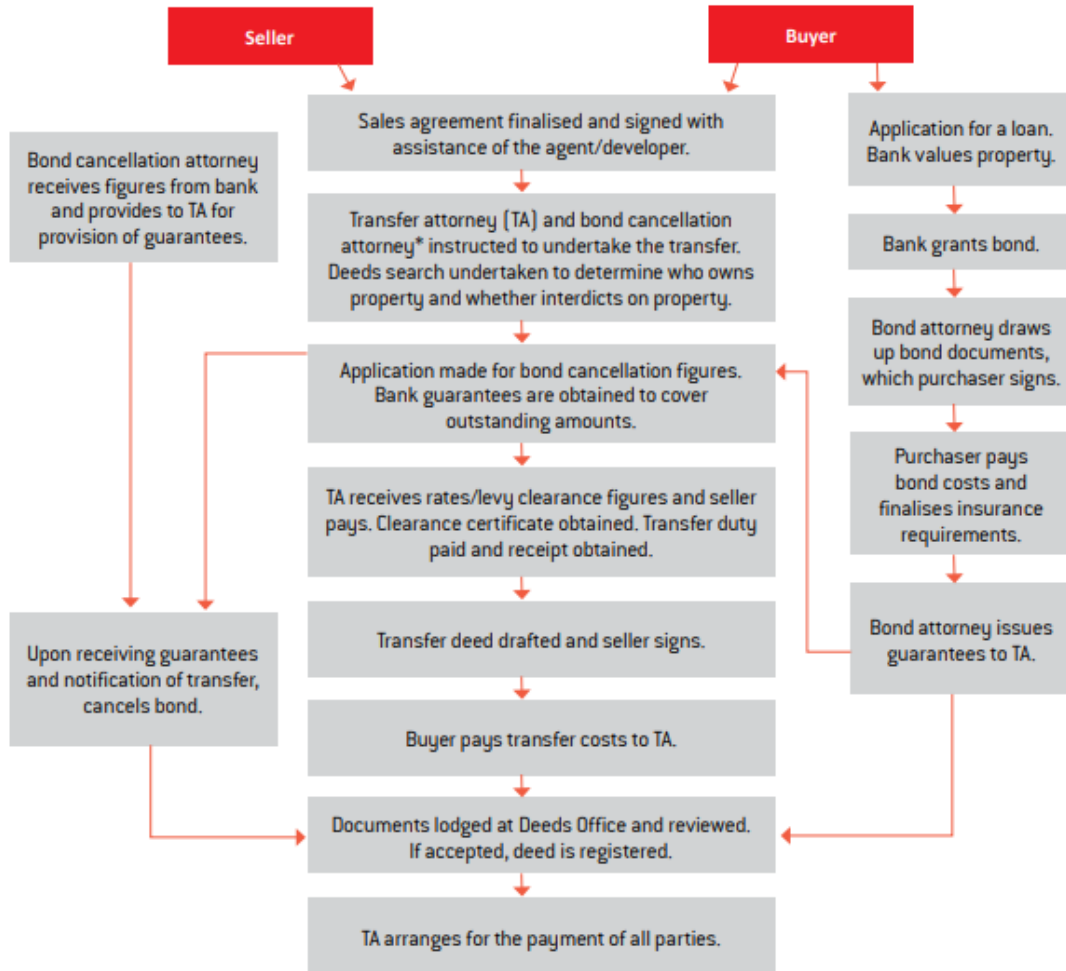
The literature review provided guidelines for the identification of recurring themes and topics which led to the formulation of the framework of analysis. Across the semi-structured interviews and other qualitative evidence collected through desktop research and document analysis, blockchain land registry pilot lessons and outcomes, the results included the recommendations of possible policies and regulations to support the adoption of blockchain technology for a decentralised land registry as a public good through PPIs to support land reform and to strengthen property and land restitution in South Africa.

CHAPTER 5: DOCUMENT ANALYSIS OF THE LAND REFORM, DEEDS OFFICE AND THE LAND REGISTRY

In this chapter, documents relating to land reform are analysed to identify the main stakeholders involved within the real estate sector and impacted by the land registry, selling, and purchasing land and property processes in South Africa. It also examines key legislation or regulations relevant to the Deeds Office and with an impact on the land registry, property and land restitution and land reform. This chapter further analyses the Deeds Office's mandate and its current structure, Deeds Office services, deeds transfer processes, deeds registration processes, root causes of some of the governance failures such as title deeds backlog, title deeds registration delay problems, the incomplete land registry, and inaccurate land audits. This chapter also reviews documents relating to the current land registry capabilities including integration capabilities with third parties.

5.1 Current Land Governance Process (Selling and Purchasing Land in South Africa)

Figure 2: The process of selling and purchasing land in South Africa⁷



*The transfer attorney and the bond cancellation attorney are both conveyancers

Figure 5-1: Process of Purchasing Land in South Africa (Source: Urban LandMark (2011))

The process of purchasing land or property is not a one size fits all and begins when the seller and the buyer (agents) sign a Sale Agreement, which normally happens under the guidance of

an estate agent, subsidised housing administrator or a developer who are key principals that can go against the agents due to corruption or fraud. The Sale Agreement or Offer to Purchase' is still currently paper-based and it is signed physically by both a buyer and a seller in front of the conveyancer who is another agent. The process of signing the Sale Agreement or Purchase Agreement has the potential to create principal-agent problems since it gets sent manually from one party to another without recording actions or flow of the documents during the transaction. The manual intervention and the paper-based agreements can empower the principals (estate agents and conveyancers) to enable corruption or fraud. The blockchain smart contract feature can augment the current land registry and presents an opportunity for the Sale Agreement to be automated, and increase efficiencies through improved and enhanced land registry public good characteristics such as transparency, security, reliability, and auditability integrated within the conveyancing processes and the lodgement of deeds processes. Other key processes that can be automated by blockchain include obtaining tax rates clearance certificates, handling transfer duties, relevant court order verifications, CIPC verifications in case of a company, and municipal rates and taxes. However, the processes depicted above on Figure 5-1 will differ in terms of automation with blockchain depending on the property market segment, the type of the transaction and the amount of the purchasing price. For example, subsidised housing and affordable housing, and other properties under R1 million are exempted from the government tax transfer duty payment process. Moreover, subsidised houses and other cash transactions do not go through the bond application processes and this makes the land registry a public good which caters for all property sector market segments namely residential, commercial, and agricultural, including land reform programmes such as the subsidised and the affordable housing.

Moreover, blockchain can automate the end-to-end processes from the Sale Agreement, conveyancing processes and lodgement of the deeds until the actual deeds registration which will enhance the land registry public good and empower the agents to do some of the tasks

directly on the system without relying on the principals such as estate agents or conveyancers due to increased accessibility. Similarly, blockchain can automate end-to-end subsidised housing processes and eliminate the current paper-based and manual processes from the application and beneficiary allocation processes up until title deed registration which will support the formal secondary market of the subsidised housing market as a result of the resales.

5.1.1 Key Laws or Regulations and their Impact on Land Reform, the Deeds Office and the Land Registry

Name of the Legislation	Description
Deeds Registries Act, Act No. 47 of 1937	This Act makes provision for the administration of the land registration system and the registration of rights in land. It requires that deeds and documents be prepared and lodged in a Deeds Registry by a conveyancer or Notary Public.
State Land Disposal Act, Act No. 48 of 1961	This Act makes provision for the disposal of certain state land and to prohibit the acquisition of state land by prescription.
Sectional Titles Act, Act No. 95 of 1986	This Act makes provision for the division of buildings into sections and common property and for the acquisition of separate ownership in sections coupled with joint ownership in common property.
Expropriation Act, Act 63 of 1975	The Act provides for the expropriation of land and other property for public use and certain other purposes as defined.

Upgrading of Land Tenure Rights Act, Act No. 112 of 1991	This Act makes provision for the upgrading and conversion into ownership of certain rights graded in respect of land, as well as for the transfer of tribal land in full ownership to a community.
Land Titles Adjustment Act, Act No. 111 of 1993	This Act regulates the allocation or devolution of certain land which one or more persons claim ownership of, but do not have registered title deeds in respect thereof.
Land Reform: Provision of Land and Assistance Act, Act No. 126 of 1993	This Act makes provision for the designation of certain land in respect of land reform, the regulation of the subdivision of such land and the settlement of persons thereon.
Distribution and Transfer of Certain State Land Act, Act No. 119 of 1993	The Act makes provision for the distribution and transfer of certain land belonging to the state and designated by the Minister as land to be dealt with in accordance with the provisions of the Act.
KwaZulu-Natal Ingonyama Trust Act, Act No. 3 of 1994	The Act makes provision for establishment of the Ingonyama Trust and for certain land to be held in trust.
Restitution of Land Rights Act, Act No. 22 of 1994	In 1994, the first law to be passed by the first democratically elected parliament was the Restitution of Land Rights Act (Act 22 of 1994). This was done with the conscious acknowledgement

	that land justice is important to deal with the challenges of poverty, unemployment, and inequality.
Land Administration Act, Act No. 2 of 1995	This Act provides for the delegation of powers and the assignment of the administration of laws regarding land matters to the provinces.
Land Reform (Labour Tenants) Act, Act No. 3 of 1996	The Act makes provision for the security of tenure of labour tenants and those persons occupying or using land because of their association with labour tenants. It also makes provision for the acquisition of land and rights in land by labour tenants.
Communal Property Associations Act, Act No. 28 of 1996	This Act makes provision for communities to form juristic persons, to be known as communal property associations, in order to acquire, hold and manage property on a basis agreed to by members of a community. This has to be done in terms of a written constitution.
Interim Protection of Informal Land Rights Act, Act No. 31 of 1996	This Act makes provision for temporary protection of certain rights to and interests in land which are not otherwise adequately protected by law.
Land Survey Act, Act No. 8 of 1997	This Act makes provision for the regulation of the survey of land in South Africa.

Extension of Security of Tenure Act, Act No. 62 of 1997	This Act makes provision for the facilitation of long-term security of land tenure, to regulate the conditions of residence on certain land and to regulate the conditions on and circumstances under which the right of persons to reside on land may be terminated.
Transformation of Certain Rural Areas Act, Act No. 94 of 1998	This Act provides for the transfer of certain land to municipalities and certain other legal entities and for the removal of restrictions on the alienation of land.
Spatial Planning and Land Use Management Act, Act No. 16 of 2013	This Act provides for a framework for spatial planning and land use management in the Republic.
Property Valuation Act, Act No. 17 of 2014	This Act provides for the establishment of the Office of the Valuer-General and for the regulation of the valuation of property that has been identified for land reform as well as property that has been identified for acquisition or disposal by a department.
Electronic Deeds Registration Systems Act 19 of 2019	This Act provides for electronic deeds registration.

Table 5-1: Key Land Administration and Management Reforms Timeline — from the Deeds Registries Act, Act No. 47 of 1937, until the Electronic Deeds Registration Systems, Act 19 of 2019 (Source: Author's own compilation)

There are various laws that govern the land and real estate sectors, and some of the land reform programmes in South Africa underpin the functioning of the Deeds Office and the land registry. This thesis conducts an institutional analysis of the key laws that govern the Deeds Office, land registry, and the land reform programme, since the passing of the DRA, which paved the way for the formation of the Deeds Office and the land registry in 1937. Moreover, the review of the laws assists the study in assessing the current institutional arrangements, such as the Deeds Office's mandate, against the possible reforms such as decentralisation and the involvement of other stakeholders through PPIs. The scope and coverage of the identified laws include laws that have influenced land reform for the restoration of justice to previously disadvantaged and marginalised citizens in South Africa following the first democratically elected government of the ANC in 1994. Moreover, the scope also covers laws that regulate the professions of key land and real estate professionals such as estate agents and conveyancers.

The identified laws are also vital in terms of understanding the overall land administration and management governance processes and their impact on the land registry in relation to land reform programmes, property transfer transactions, property security tenure, ownership, and title deeds registration as well as governance around property data and information. Dissecting these laws also assists in understanding what enables the current land governance inefficiencies within the Deeds Office and around the land registry.

In order to assess the current Deeds Office and land registry challenges, issues and limitations, this thesis conducts institutional analysis and a review of relevant laws governing the Deeds Office and the land registry to investigate and to understand how the current policies and regulations hinders the land registry from functioning as a public good characterised by inclusiveness, transparency, security, accessibility, auditability, reliability, and accountability. This will also help investigate the current information asymmetries and other causes of the principal-agent and collective action problems in terms of accessing the land registry data and information as argued by McCubbins, Noll and Weingast (1987), and how certain policies and

regulations support the land reform programme. Below are some of the key laws identified since the formation of the Deeds Office and the land registry in 1937, including recent laws that are creating an enabling environment for the digitisation of the land registry such as EDRSA. Moreover, this thesis also identifies laws that have shaped and influenced land reform in South Africa since 1994.

5.1.1.1 Deeds Registry Act 47 of 1937

This Act consolidates and amends the laws in force in the then-Union relating to the registration of deeds. This legislature articulates the Deeds Office's current mandate, and the functions and capabilities of the land registry. Chapter 1. (I) states that there shall be deeds registries at Cape Town, King Williamstown, Kimberley, Vryburg, Pietermaritzburg, Pretoria and Bloemfontein, each to serve its respective area as defined in Schedule 2 of the Act. Furthermore, the Rand Townships Registration Office at Johannesburg was also established as a deeds registry, but only in connection with the registration of documents relating to immovable property in any township in the area defined in the Schedule.

The current DRA limits the land registry public good to function with enhanced accessibility and transparency to benefit all the citizens. Although there is an element of decentralisation already within the Deeds Office — as it has offices in each province in South Africa — there is still room to decentralise the land registry further to allow other organisations, both public and private, to take part in the daily management and monitoring of the property transfer transactions on the land registry. The current institutional arrangements regarding the Deeds Office's jurisdiction do not cover the currently underserved remote areas and rural provinces where there are governance issues such as title deeds backlogs and outstanding title deeds for properties that reside within communal land. Decentralisation of the land registry can empower stakeholders such as municipalities and developers to process deeds transfers, which may provide an opportunity to deal with some of the current inefficiencies, principal-agent, and

collective action problems due to possible increased accessibility, transparency, and accountability.

Furthermore, Regulation 18 enables the Registration Regulation Board, upon approval by the Minister to make regulations prescribing “the manner and form of identity of persons”. Currently the Act makes provision for the “name, identity document (ID) number, date of birth or registered number to be recorded in the Deeds Registry”. Currently, there is still a lot of crucial information not being recorded on the land registry that can help deal with the current inefficiencies and some of the corruption and fraud issues. The Advisory Panel on Land Reform and Agriculture (2019) recommended that the status of citizenship, nationality, permanent residence status and gender, race, South African ID number, foreign passport number, company registration number, income tax number, VAT registration number, nature of shareholders, Trust registration number and nature of beneficiaries should be disclosed and included in the registry. Furthermore, they recommended that amendments to the DRA will require an enactment by Parliament as it will require existing owners to make declarations and disclosures similar to what is expected of future owners under Regulation 18. The amendment must deal with the following compulsory requirements:

1. identification of owners,
2. a verification system of landowners,
3. accurate and reliable record keeping,
4. monitoring mechanisms, and
5. the procedure for forfeiture of land to the state where there is non-compliance.

(Advisory Panel on Land Reform and Agriculture, 2019)

The amendment as stated above can potentially improve the land registry public good and become more reliable with complete tamper-proof ownership data and information. Enhancing

the land registry to include information such as citizenship status, nationality, permanent residence status and foreign passport numbers can help deal with some of the principal-agent problems such as fraud issues within the subsidised housing market whereby some local beneficiaries end up selling their houses to undocumented foreign citizens. Similar principal-agent problems can occur in the mid- to high-end property market segments with foreign citizens buying properties using cash, which can enable fraudulent activities such as tax avoidance and corruption activities whereby foreign citizens can bribe agents such as estate agents, conveyancers, and Deeds Office officials. The blockchain land registry, integrated with the DHA to verify foreign buyers, can potentially assist in this regard.

5.1.1.2 Alienation of Land Act 68 of 1981

This Act regulates the alienation of land in certain circumstances. According to Chapter 18,, Section (4), if any seller agrees to transfer land to another remote person through a contract, the recipient has power of attorney over the transfer and may appoint a conveyancer to execute the deed of transfer. The Alienation of Land Act makes it a mandatory requirement that the sale or alienation of land agreements must be registered in the Deeds Registry (Advisory Panel on Land Reform and Agriculture, 2019). The sale of land agreements are currently manual and paper-based, and need to be automated and integrated into the land registry. Currently the land registry relies on conveyancers to conduct property deeds transfers which comes with additional costs to both buyers and sellers. The dependency on conveyancers and the associated conveyancing fees on top of other fees such as tax duty transfer costs and bond costs in the case of a bonded transaction may create opportunities for corruption and fraud. Moreover, the reliance on conveyancers for property transfers can also cause more problems for other citizens or property market segments wherein some property owners are unable to afford the conveyancers' fees. For example, property owners in the low-income property market segments such as the subsidised, affordable, and communal land housing segments may not be able to afford conveyancing fees, hence they currently resort to the informal trading of land.

Automation through a technology innovation such as blockchain aims to increase accessibility of the public good in a cheaper way which empowers citizens to conduct property transfers and register deeds online which may help reduce the current costs, inefficiencies, corruption, and fraud. Blockchain smart contracts have the potential to automate the Sale Agreements or Offers to Purchase and eliminate the need for a remote purchaser to appoint an attorney to facilitate the land transfer on their behalf if they can use the system themselves.

5.1.1.3 Sectional Titles Act 95 of 1986

This Act provides for the division of buildings into sections and common property, and for the acquisition of separate ownership in sections coupled with joint ownership in common property; the control of certain incidents attaching to separate ownership in sections and joint ownership in common property; the transfer of ownership of sections; and the registration of sectional mortgage bonds over and real rights in sections. Moreover, Part 1, Section 2, Subsection (e) states that a registrar may register a title deed in a deeds registry that records the ownership or transfer of a section in a common property.

The land registry as a public good needs to accommodate all types of properties so that it can serve all citizens. Most middle-income earners are the owners of sectional title properties. The sectional title property market segment is also a secondary market for most of the property owners who often buy sectional title properties for investment purposes or to rent or to let. There is quite a substantial number of sectional title properties in South Africa that are registered on the land registry; digitising land registry processes with tamper-proof historical transaction records to make it easy for property owners to update their ownership information and receive notifications whenever there are ownership changes being made on their properties might reduce elements of fraud (for example, tenants could try to defraud the property by pretending to be the rightful owner of the property). A digital land registry with mobile interfaces that landlords can use to regularly check and update their ownership information is

needed to reduce fraudulent activities against landlords, including those who are resident in foreign countries. Since most of the middle-income population often buys sectional title properties, reports from the land registry in terms of the land audit need to be reliable for the government to assess progress in terms of land ownership statistics in South Africa so that they can respond with relevant interventions.

5.1.1.4 Upgrading of Land Tenure Rights Act 112 of 1991

This Act provides for the upgrading and conversion into ownership of certain rights granted in respect of land (particularly with regards to townships); for the transfer of tribal land in full ownership to tribes; and for matters connected therewith. Chapter 13, Section (1) states that if a township owner, with reference to any formalised township, intends to transfer ownership of a property that no formal land tenure right has been granted over, they may do so by submitting a certificate of ownership at the deeds registry.

The reliability of the land registry public good is critical to provide evidence in terms of township land ownership and to assist the government to fast track its land reform programmes. Proper recording of township land ownership can help deal with potential principal-agent problems between government officials such as councillors, tribal chiefs, and developers. For example, a councillor can persuade a developer to pay a bribe to the tribal land chief so that the developer can be given the land instead of another developer who is not willing to pay a bribe.

5.1.1.5 Restitution of Land Rights Act 22 of 1994

This Act provides for the restitution of rights in land in respect of which persons or communities were dispossessed or for the purpose of furthering the objects of any racially based discriminatory law; establishes a Commission on Restitution of Land Rights and the Land Claims Court; and to provide for matters connected therewith. Section 25 (b) of the procedure, after the lodgement of land claim, requires that records of the claim must be noted in the relevant property deed.

Given the apartheid injustices in South Africa, where rightful owners were dispossessed of their land, the land registry as a public good can make a positive contribution towards the restoration of justice through land ownership in terms of making provision of tamper-proof historical property ownership information going forward.

Blockchain can also potentially enhance the land registry to become more inclusive, complete, and accessible by the majority, which may help fast track the implementation of the land reform programme including land claims processing. Although the land registry may not be able to deal with land claims disputes, having a reliable land registry with tamper-proof records can assist with recurring land claims disputes that have been resolved post-1994 and on an ongoing basis. Without a reliable, tamper-proof land registry with historical property and land transfers transactions, corruption and fraud could persist beyond apartheid injustices around land claims and the government may not be able to manage and monitor progress made through its land reform programmes.

5.1.1.6 Housing Act 107 of 1997

This Act provides for the facilitation of a sustainable housing development process. It states that when a person vacates their property, the relevant provincial housing department shall be deemed to be the owner of the property and application must then be made to the Registrar of Deeds by the provincial housing department for the title deeds of the property to be endorsed to reflect the department's ownership of that property. Furthermore, the Act states that the relevant Registrar of Deeds must, at the request of the provincial government, provide certification that the property has been transferred to the provincial housing department and update their records to reflect this. Regarding land reform programmes such as RDP-subsidised houses, there are various laws that provide guidelines in terms of implementation. Some laws have a direct impact on the land registry and are intentional in terms of strengthening the land

registry as a public good. These were also highlighted by Interviewee #4 (2021), who specialises in conveyancing around subsidised houses:

There was the Black Communities Development Act and there was a Conversion of Certain Rights to Leasehold Act, Upgrading of Land Tenure Rights Act, Lease Form of Town Establishment Act, Development Facilitation Act, KwaZulu Natal Planning and Development Act, Northern Cape Planning and Development Act, Western Cape Land Use Planning Act, so there were different pieces of legislation which can be used to establish a township and you can also establish a township where RDP houses conforms in terms of the same legislation that was used to establish the township in Houghton or in Cape Town, wherever, so there are different pieces of legislation, so the process before certain stand or houses can be transferred can be similar in terms of the township's establishment.

(Interviewee#4, Zoom Interview, June 2021).

Compliance with the relevant laws as highlighted by Interviewee #4 will ensure effective land governance so that the recorded titled deeds are free from disputes or are not questionable.

According to Khan, Andreoni, and Roy (2019), governance failures of different types in developing countries often have a common source in the significant informality in the operation of the economy and polity as well as the use of political rents to maintain ruling coalitions. These features of developing countries are related to the dominance and power of organisations that do not have an interest in the enforcement of formal rules in general, though some of them may occasionally want the enforcement of some rules that are aligned with their interests. Due to the backlog of title deeds for subsidised houses, some of the beneficiaries are now fraudulently selling their houses privately, going against the Housing Act, and this has given

birth to an informal market. Interviewee #4 (2021) argued that the Housing Act seeks to prevent corruption and fraud by prohibiting beneficiaries from selling their subsidised houses for a period of eight years after receiving them:

Section 8 of the Housing Act prohibits the sale of a house received with government funding within a period of eight years after a transfer, except if they approach the Department of Human Settlements and they request a written consent to allow such transfer to happen.

(Interviewee #4, Zoom Interview, June 2021).

Corruption and fraud can also occur at any stage of the process outside of the land registry due to the current manual and paper-based land governance processes before a property is transferred or registered on the land registry. However, this thesis focuses specifically on how to mitigate fraud and corruption within the land registry. The quality, integrity, and sustainability of the deeds transfers transactions is also dependent on the compliance of various laws that govern the land registry.

5.1.1.7 Land Survey Act 8 of 1997

This Act regulates the survey of land and to provide for matters connected to that. Chapter 10 states that no general plan or diagram of any piece of land shall be accepted in any Deeds Registry unless it has been approved by the Surveyor-General. Without proper recording and easy access to the land records and their valuations, principal-agent problems might also occur by manipulating the valuations when valuers are corrupted agents.

The current paper-based and manual processes can enable principals such as conveyancers and agents such as valuers and Deeds Office officials to tamper with valuations when processing property transfers. Blockchain could offer tamper-proof historical valuation information that

can assist in verifying valuations and assessing if the proposed valuations are market-related or realistic. Market-related valuations from a reliable system such as blockchain can assist the government to establish a fair value when purchasing land from private individuals for the purpose of land reform programmes.

5.1.1.8 Promotion of Access to Information Act 2 of 2000 (PAIA)

This Act gives effect to the constitutional right of access to any information held by the state or another person and which is required for the exercise or protection of any rights. Similarly to POPIA, the decentralised blockchain land registry also needs to comply with PAIA for effective land governance.

A blockchain land registry can support the land reform programme and be relied upon by the government when resolving some of the land governance inefficiencies that require land and property ownership information, and assist in terms of providing data and information for the government to make informed decisions around land reform and to investigate corruption and fraud. For example, allowing relevant authorities or law enforcement agencies to gain access to property ownership information is key for the purpose of investigating corruption and fraud cases. Moreover, if the policies and procedures are not carefully assessed, complying with PAIA can also give birth to new principal-agent and collective action problems and may perpetuate information asymmetries among various stakeholders. For example, granting access or providing ownership data and information only to law enforcement agencies such as the Public Protector, South African Police Service (SAPS) and the National Prosecuting Authority (NPA) and denying the same access to other private crime-fighting organisations such as Corruption Watch and professional bodies such as the Law Society of South Africa (LSSA) and the PPRA to conduct their own investigations on certain transactions may create information asymmetries and cause other principal-agent and collective action problems that enable fraudulent and corrupt activities to not be properly prevented, investigated or exposed

due to a lack of sufficient transparency. For example, during investigations, if only agents within the public sector institutions are conducting investigations, there could be collective action problems whereby agents such as estate agents and conveyancers can collude with other agents such as the police and compromise the investigation, but if a private organisation with public interest at heart such as the Corruption Watch is also participating in terms of representing the aggrieved and providing evidence where possible, this can help prevent the collective action problems highlighted by Olson (1965).

New institutional reforms and arrangements to support the implementation of the blockchain must consider various legislation and their impact on the land registry to ensure that the required controls support the land reform and assist in dealing with corruption and fraud are in place.

5.1.1.9 Electronic Communications and Transaction Act 25 of 2002 (ECTA)

This Act governs all electronic communications and transactions and aims to promote universal access to the same, while preventing abuse of online systems. Chapter 1, Section 4 states this Act may not be construed as giving any validity to transactions covered by the Alienation of Land Act.

Currently, ECTA is not explicit in terms of allowing electronic signatures for immovable properties which will pave a way for the automation of Sale Agreements using blockchain smart contract features. Without clarity around whether electronic signatures are allowed for immovable property, blockchain smart contracts cannot be incorporated into the land registry processes to deal with the current manual and paper-based processes and other fraudulent issues such as forging of signatures on Sale Agreements and other documents such as wills.

This Act has promoted and encouraged the use of e-government services since it was enacted in 2002. The blockchain land registry can become an e-government services that can be utilised by the rest of the population if the government can also deal with other dependencies such as

broadband connectivity for all and cheaper data tariffs so that all citizens can have access to the land registry. This Act also paves the way for the digital transformation programme to also focus on human resources development by upskilling and reskilling affected stakeholders, and improving community awareness and training post the adoption of blockchain.

5.1.1.10 Protection of Personal Information Act 4 of 2013 (POPIA)

This Act provides the guidelines around the protection of personal information processed by public and private bodies; establishes minimum requirements for the processing of personal information; and provides for the establishment of an Information Regulator, who is also responsible for PAIA requirements. This Act requires any holder of private information to maintain the confidentiality and security of that data and prevent any unauthorised access, loss or corruption.

Since blockchain technology's data structures have inherent security qualities because they are based on consensus, cryptography, and decentralisation principles, and each new block of information connects to all the previous blocks in a way that it is nearly impossible to tamper with (Simplilearn, 2022). However, blockchains are also subjected to cybersecurity and cybercrime risks just like any other ICT and complying with POPIA is vital. A centralised, blockchain land registry will also be required to comply with POPIA by ensuring that it has sufficient security safeguards and measures in order to protect and guarantee privacy around property owners' personal information. Moreover, putting measures and controls in place to comply with POPIA can also create new principal-agent and collective action problems and information asymmetries, requiring careful assessment and the implementation of relevant mitigation controls to guarantee transparency and avoid exacerbating corruption and fraud in an electronic environment. For example, granting access to property ownership information on the blockchain land registry only to Deeds Office officials and conveyancers without granting the same access rights to other key stakeholders such as estate agents, municipal officers, bank

officials, valuers and SARS officials could create information asymmetry problems between principals and agents and erode transparency in terms of monitoring the transactions. This Act enforces effective governance by forcing the digital or electronic land registry to be secured, auditable and reliable to protect the land and property ownership data and information in South Africa.

5.1.1.11 Legal Practice Act No 28 of 2014

The Legal Practice Act states that no person may, in expectation of any fee, commission, gain or reward, directly or indirectly, perform any act or render any service which may only be done by an advocate, attorney, conveyancer or notary, unless that person is a practising advocate, attorney, conveyancer or notary. The Act governs the conduct of key agents such as advocates, attorneys, conveyancers, or notaries. Through the South African Legal Practice Council's Code of Conduct, these agents can also be disciplined for violating the code of conduct or if involved in any corruption and fraud (Legal Practice Council, 2020).

5.1.1.12 Electronic Deeds Registration System Act No 19 of 2019 (EDRSA)

This Act provides for electronic deeds registration, with due regard to legislation on electronic communications and transactions. Section 2 directly mandates the Chief Registrar of Deeds to establish an electronic deeds registry that is functional and secure.

The EDRSA presents the Deeds Office with an opportunity to embark on a digital transformation programme that can facilitate the adoption of blockchain technology to implement a decentralised land registry through PPIs which could enhance transparency, accountability, inclusivity, accessibility, security, reliability, and auditability for the public good. However, in order for the blockchain to automate end-to-end processes and to get rid of the current inefficiencies, corruption and fraud, the current third-party service providers must be empowered to provide interfaces that automate the current manual and paper-based processes, such as subsidised housing applications.

The EDRSA enables the development of an Electronic Deeds Registration System (or e-DRS) (Benaters, 2019). The current DRS faces several challenges, including an inability to scale according to volume, particularly in anticipation of 20 million land parcels that will potentially be processed through the government's land reform measures; integration with the electronic Cadastral Information System to improve efficiency and accuracy to South Africa's land information management; the demand for a decentralisation of services which would improve delivery at the point of need; consolidating diversified legacy registration procedures; and limited capability and capacity for future forms of land tenure that may be introduced (Benaters, 2019).

Despite government efforts, South Africa is still faced with land governance inefficiencies ranging from the title deeds backlog for RDP housing which is at the heart of property ownership by the majority of South Africans; delays in terms of the registration of title deeds, which can take up to three months due to inefficiencies; manual and paper-based driven processes; and the high costs of purchasing land and property. Other costs such as the transfer of property and title deeds registration in South Africa also remain very high for most of the citizens. The fact that the process of buying and selling property is currently heavily dependent on estate agents and conveyancers, also results in high costs and becomes unaffordable by most citizens. These challenges collectively negatively impact the implementation and management of the land reform programmes and make it possible for corruption and fraud to occur within the real estate sector. The implementation of the ERDSA presents the government, through the Deeds Office, with an opportunity to address some of these challenges.

5.1.1.13 Property Practitioners Act No 22 of 2019

The Property Practitioners Act's objective is to provide for the protection of the consumer in property transactions, requiring property practitioners to uphold and protect the interests of the

consumer. Furthermore, a central feature of that duty is upholding and maintaining the highest standards of ethical conduct in order to avoid corruption and fraud.

5.1.14 Cybercrimes Act 19 of 2020

This Act provides for the creation of frameworks of crime and punishment with regards to crimes occurring in a digital space, including reporting responsibilities, international cooperation and to update existing laws to cater for cybercrimes. Like any other ICT technology, blockchain technology will also be subjected and vulnerable to cybersecurity and cybercrime risks and threats. Proper assessment must be conducted, and suitable mitigations employed against new forms of corruption and fraud that may erode or cancel the benefits and efficiencies that blockchain seeks to deliver to support land reform.

5.2 Land Governance Inefficiencies

Highlighted below are some of the current land governance inefficiencies including insecure tenure for properties within the communal land and informal settlements, the title deeds backlog for subsidised RDP houses and delays in processing deeds transfers and title deeds within the Deeds Office.

- In 2010, about 26,8 million people were living in urban areas in South Africa, including 4,9 million in informal settlements with insecure tenure (Urban LandMark, 2013). The Deeds Registry is continually updated and released, although there is a lag of sometimes more than a year as records percolate up from the local deeds' registries (Council for Scientific and Industrial Research South Africa, 2020). The current DRS is fragmented, and each province appoints its own registrar, which causes delays in terms of consolidation into the main registry.
- The *Mail & Guardian* reported in 2016 that the estimated backlog in issuing title deeds in South Africa's RDP housing project was than 900 000. The Urban LandMark (2011)

report suggested that it is estimated that just over one-third, or between 1,1-1,4 million subsidy beneficiaries do not have the title deeds to their properties. The RDP project is reported to be the largest government-subsidised housing project in the world and has delivered three million units in the past 20 years (Property Professional, 2018). The government is battling to catch up with a mountainous backlog of title deeds for RDP houses caused by several land governance inefficiencies. Beneficiaries' title deeds are not properly recorded and secured in the land registry.

- The process of deeds registration currently takes a long time. According to the Deeds Office, it takes 10 days to deliver a title deed to the conveyancer after registration. Completion of the necessary administrative actions includes number allocation, affixing an authentication seal of the office, quality assurance procedures, information capturing, and scanning for archiving purposes (Deeds Office, no date).
- According to the *Mail & Guardian* (2016), the primary cause of the backlog is the failure of developers to complete the establishment of townships, delaying the creation of a register needed for each new housing area. Although the root causes of the title deeds backlog are not within the Deeds Office, this could negatively affect the management of land reform programmes and enable corruption and fraud due to an incomplete and unreliable land registry.
- Common problems identified include the fact that land reform in South Africa has yielded little success in establishing a new generation of sustainable small-scale and commercial black farmers. The reasons cited include an absence of security of tenure, a lack of transfer of title deeds to the acquired portions of land to beneficiaries, and the poor post-settlement support system (Advisory Panel on Land Reform and Agriculture, 2019). Because of this, government will not be able to manage the land reform programme effectively and efficiently.

5.3 Corruption and Fraud Cases and Allegations

Several land reform corruption and fraud allegations and cases have been reported in the media in South Africa. Below are some of the incidents or cases of corruption and fraud since 2010, identified through desktop research, which reveals some of the principal-agent and collective action problems involving principals such as residents, RDP house beneficiaries and farmers, and agents such as government officials. The identified cases are specifically related to the land and real estate sector.

- A 2010 presidential project intended to house shack dwellers in the south of Johannesburg was mired in corruption and wholesale land theft, with hundreds of residents cheated out of houses they paid for. GroundUp discovered that, in Orange Farm, residents paid up to R25 000 to secure housing units in the township, only to find that the units had been sold to other buyers. They have since been trying for four years to get their houses or their money back, without success. Moreover, the DA, the main opposition party in South Africa, indicated that they would write to President Cyril Ramaphosa to request that he authorise an urgent probe by the SIU into allegations that a group of successful, emerging black farmers in Mpumalanga have been harassed and face eviction from farms by corrupt officials in the DALRRD, simply because they refused to pay bribes. Due to a lack of records that prove that residents were allocated certain houses, the government cannot effectively deal with this kind of corruption. However, blockchain may not prevent the government officials from demanding that the residents pay illegal deposits or bribes to secure their land or houses, but interventions such as citizens' education around subsidised housing crime, corruption and fraud might assist.
- According to the DALRRD (2018), a number of officials are being investigated by the NPA and SIU for fraud and corruption relating to farm allocations for a project that

ended in 2010. They found that officials from both the then-Department of Rural Development and Land Reform and the Department of Agriculture (which have since merged into the DALRRD) had either created fictitious beneficiaries of land, or allocated land to friends and family. Furthermore, the SIU, found “major systemic weaknesses” in a land reform project which resulted in the fraudulent acquisition of land worth more than R382 million (US\$28 million), according to a report by the South African newspaper *Business Day* (Organised Crime and Corruption Reporting Project, 2019). The SIU examined 148 individual land reform projects between 2011 and 2017 and found that one in four was fraudulent (Organised Crime and Corruption Reporting Project, 2019). Moreover, the SIU (2019) indicated that its investigations not only revealed major systemic weaknesses in the department of land redistribution and agricultural development sub-programme, but also in systems, controls and mechanisms of the land reform programme itself; in an analysis of each of the irregular or fraudulent land reform projects investigated, the SIU detailed how, in many instances, thousands of alleged beneficiaries were not aware of the project, had never been to the farm, had never lived or worked on a farm and did not qualify for grants. Automating the beneficiaries’ waiting list and the application process using blockchain could provide tamper-proof evidence that can assist in the investigations of corruption issues such as nepotism and prevent fictitious beneficiaries being allocated to the land.

- Lebo Keswa (2019), a spokesperson from the Gauteng DHS said that the Anti-Fraud Unit had compiled a list of 42 RDP houses in Alexandra township that were believed to be under illegal occupancy by immigrants and was working with the DHA to confirm nationality and the validity of the nationality. However, it is believed that some foreigners are rightful owners who bought RDP houses from South African nationals. Blockchain could automate the application processes to vet all the applicants upfront to check suitable beneficiaries and reject beneficiaries such as illegal immigrants by validating the beneficiary’s identity with the DHA database.

It is evident that there are investigations of corruption and fraud and some convictions in relation to land reform programmes, involving key stakeholders such as the DALRRD, the Deeds Office, local municipalities, and DHS. However, the government may not be able to provide the necessary evidence to conclude some of the investigations due to a lack of tamper-proof records. By implementing a blockchain-based land registry solution which could assist with capturing the potential beneficiaries on the waiting list and facilitating the actual beneficiary allocations in a fair and transparent manner, the government will have tamper-proof records going forward.

5.4 Deeds Office Policies, Processes, Systems, and Technologies

5.4.1 The Deeds Office's Current Mandate

The Deeds Office is responsible for the registration, management, and maintenance of the property registry of South Africa. The deeds registration branch is an entity of the DALRRD. It is mandated to register title deeds and documents; manage and maintain the country's land register; provide information related to registration; and archive the records. There are 11 deeds registries located in cities in all nine provinces, namely Bloemfontein, Johannesburg, King Williamstown, Mpumalanga, Pretoria, Cape Town, Kimberly, Limpopo, Pietermaritzburg, Umtata and Vryburg. The deeds registries are overseen by the Office of the Chief Registrar of Deeds (OCRD) (Deeds Office, no date). Furthermore, the DRA also ordered that the Governor-General may appoint a Chief Registrar of Deeds to act as the chairman and executive of the Registries Regulations Board.

The Deeds Office is central to land administration and management processes in South Africa and plays a crucial role in providing information to assess and measure ownership of land and properties in the form of title deeds. The Deeds Office's processes, data and information are very useful in detecting or preventing some of the land-related corruption and fraud in South

Africa. As part of the registration process, the Deeds Office collects crucial information and documents during the deed lodgements and deed transfers processes, which are carried out by conveyancers and Deeds Office officials such as notaries and examiners. The Deeds Office's officials also scrutinise the documents lodged by the conveyancers to prevent elements of corruption and fraud. However, the deeds examination process of the Deeds Office is manual, which makes it hard to detect and prevent some of the corruption and fraud elements. The paper-based process can enable corruption and fraud if documents such as the Sale Agreement or Offer to Purchase, IDs, marriage certificates, municipal rates and tax clearance certificates, bond registration documents and transfer duty documents are tampered with.

An integrated blockchain land registry has got a potential to reform the current Deeds Office's mandate and structures by enabling decentralisation through bringing other stakeholders on board, such as municipalities and banks, to help co-manage the land registry. However, the land registry is currently incomplete, and the process of transferring land or property can take up to three months. There is also a backlog of about 1,5 million subsidised housing title deeds. In addition, low security of tenure for properties within communal land and informal settlements also means that there are still outstanding properties that belong to low-income and poor populations that are yet to be secured by issuing title deeds. To deal with some of the legacy challenges and issues, the government introduced the EDRSA.

5.4.2 Deeds Office Services

The Deeds Office offers various services to support land reform and to ensure the sustainability of the overall real estate sector.

5.4.2.1 Registration of real rights in land

This involves the lodgement and preparation of title deeds and documents by conveyancers, notaries, or other authorised officials for purposes of registration. It also deals with the examination of deeds and documents to ensure compliance with the provisions of relevant legislation. Due to paper-based and manual processes, the registration process can create principal-agent problems and collective action problems whereby estate agents, conveyancers, municipal officers and Deeds Office officials can collude and allow fraudulent documents to be processed as legal or legitimate. The registration services can be further decentralised to allow other stakeholders such as municipalities and banks to capture and process the registrations without relying on the conveyancers. This will increase accessibility, reduce conveyancing costs and completely remove costs for low-value property market segments. Conveyancers, together with Deeds Office officials, can still conduct the final verifications to ensure the integrity of land rights.

5.4.2.2 Maintenance of the public land register

This entails data capturing and updating of information on the DRS. In a decentralised environment, through PPIs, other stakeholders such as banks and municipalities can also have the same copy of the database as the Deeds Office. Through consensus on transactions from other key stakeholders partaking in the maintenance of the land registry such as the SARS, CIPC (for company verifications), DHA (to verify ID documents, passports and marriage certificates) and the DoJ&CD (to verify certain court orders and will and testaments), the public good of the land registry will increase and it will become more sustainable. Institutional reforms must bring more transparency and accessibility to these important functions to keep the land registry up-to-date by integrating various stakeholder systems and allowing more stakeholders to perform functions.

5.4.2.3 Provision of registration information

The Deeds Office provides print outs of property ownership information for judicial purposes and provides research on the history of properties. A decentralised blockchain land registry can be developed to empower citizens with interfaces that can be accessed through computers and mobile devices irrespective of the market segment. The current research history cannot be relied upon if the land registry is still incomplete and there are still paper-based and manual processes being used for capturing and updating information on the land registry. Only tamper-proof historical information and data from a complete land registry will be able to support land reform and the government to come up with necessary interventions and assist in dealing with corruption and fraud.

5.4.2.4 Deeds Registration Trading Entity Online Services

The Deeds Registration Trading Entity provides online information services to the public at large. The current PPI arrangement between the Deeds Office and other third-party service providers to provide online interfaces to access and search the land registry is another form of land registry decentralisation. Currently, however, the third-party interface only provides access to the land registry and users cannot capture deeds transfers or upload the necessary documents, lodge deeds transfers, or update deeds. Moreover, third parties rely on the Deeds Office database and if the Deeds Office database is offline, they also become offline. An opportunity exists for the Deeds Office to consider incorporating existing third parties to form part of the decentralisation model. Through blockchain, they could also maintain the same copy of the land registry database, which will increase security and avoid a single point of failure. Third parties can also build interfaces that empower citizens to capture and update deed transfers, which will increase accessibility, transparency, and accountability beyond just offering access to the land registry. The current third-party service providers could also be part of the PPI setting and, with their skills and resources, assist government with implementing the digital transformation programme and adopting a decentralised blockchain land registry.

5.4.2.5 Maintaining an archive of registration records

This involves scanning of deeds and documents, microfilming of records, storage of paper volumes, and maintenance of vaults, storage, and archives of electronic information. Blockchain could provide the Deeds Office with the most secure digital storage, which will safeguard records and deter or prevent some of the corruption and fraud elements from occurring. A blockchain land registry could eliminate the current duplication of effort, whereby subsidised housing beneficiary applications and supporting documents circulate around various stakeholders including subsidised housing administrators, municipalities, DHS, conveyancers and the Deeds Office by providing the same copy of the database for all the relevant stakeholders to support land reform. Moreover, third parties and other key organisations such as banks, through PPIs, can also have the same copy of the database which can prevent a single point of failure by not relying only on the Deeds Office database for crucial data.

5.5 Reasons for Transferring or Registering Property

It is important to understand the current institutional arrangements in terms of how certain land registry processes get initiated, and their associated reasons or objectives, so that institutional arrangement reforms that will support land reform and mitigate corruption and fraud can be configured accordingly. Understanding the reasons for transferring properties can also assist in unpacking the principal-agent and collective action problems' root causes. According to the Deeds Office (2023), below are some of the reasons for transferring or registering a property:

Transfer arising from inheritance

“This is a transfer of the property of a deceased person by a representative or executor of the deceased estate either in terms of a will or the laws of intestate succession (inheritance without a will)” (Deeds Office, 2023). With manual and paper-based processes, fraud can easily be done if a fraudulent will or affidavit gets submitted to the Deeds Office without a thorough verification of the source to confirm legitimacy. Moreover, there can be a principal-agent action

problem, for example between a family member as a principal and an agent such as councillor, estate agent, conveyancer or Deeds Office official, whereby a principal can offer bribes to an agent to assist in defrauding property from the intended beneficiaries.

Transfer arising from donation

“This is a transfer of the property donated by one person (donor) to another provided that the beneficiary has accepted the donation in writing” (Deeds Office, 2023). This can also be used as a vehicle for fraud where illicit funds or money can be used to purchase a property, while the transfer is registered as a donation so the payment is not recorded. Verifying the sources of the donation or the current owners of the property can prevent some of the fraudulent donation transactions.

Transfer arising from sale

“In this case transfer of ownership is based on a sale to the purchaser either by private treaty or public auction” (Deeds Office, 2023). Currently, property purchasing processes are done manually and are not integrated with the land registry. This sometimes contributes to information asymmetries between buyers and sellers with the estate agents or conveyancers at an advantage to enable corruption and fraud.

Transfer arising from exchange

“This is transfer of land ownership whereby two or more parties exchange their ownership over different pieces of land” (Deeds Office, 2023). Verification of the rightful owners is crucial to avoid fraudulent exchanges.

Transfer arising from rectification

“This is a transfer of property back to the correct owner after being registered in error in another person’s name” (Deeds Office, 2023). This keeps the land registry in check and affords property

owners and the Deeds Office an opportunity to amend incorrect ownership information that will assist in preventing corruption and fraud.

Transfer arising from dissolution of a partnership

“This is a transfer of a property belonging to a dissolved partnership to some or all the former partners” (Deeds Office, 2023). The land registry can conduct the verification of the dissolution and affected partners can prevent fraud, whereby one partner can submit a false dissolution without consulting other partners.

Transferring or registering property can also be triggered by juristic acts or operation of law. Gebrihet and Pillay (2021) argued that a non-digitised land administration system, insufficient capacity, and weak monitoring and evaluation systems impeded the pursuit of enhanced municipal government services. Subsidised houses, properties within communal land and in informal settlements are currently not subjected to the formal transfer triggers because of the current inefficiencies such as the backlog of the title deeds for, outstanding title deeds for properties within communal land, the municipality’s inability to collect revenue for water, sewage, and municipality rates, and the lack of an inclusive, accessible, complete, reliable and auditable land registry. Understanding these transfers triggered by law is important so that the blockchain land registry can be configured with the necessary checks and balances to also detect some of the corruption and fraud.

The Deeds Office (2023) highlighted the below reasons that arises from juristic acts or operation of law:

Transfer arising from divorce

“This refers to a transfer of property in terms of a divorce order whereby property is transferred either to both or one of the divorced partners” (Deeds Office, 2023). Verification of marriage

certificates, marriage type, and divorce decrees from the relevant authorities is required in order to detect fraudulent documents. Importantly, subsidised houses are jointly owned by both partners as required by the government.

Transfer arising from prescription

“This refers to a transfer in terms of a court order whereby ownership is granted to one person due to their adverse occupation or possession of the property as if they owned it for a period of 30 years without interruption from its registered owner” (Deeds Office, 2023).

Transfer by virtue of marriage in community of property

“This transfer takes place by virtue of the fact that when two people marry each other in community of property each of them obtains an undivided half share in the property of the other without an actual deed of transfer” (Deeds Office, 2023). Currently most verifications are conducted manually by estate agents, conveyancers, subsidy systems administrators, DHS officials and Deeds Office officials such as the examiners. An integrated land registry that is integrated with the DHA systems to automatically verify marriage types is crucial to deal with some of the fraudulent transactions arising from divorces or separations and death of a spouse.

Transfer in an insolvent estate

This transfer occurs in terms of the laws of insolvency whereby the property of an insolvent person (a person whose liabilities exceed his assets) is transferred by law to the trustee in his insolvent estate without an actual deed of transfer” (Deeds Office, 2023). Integrating the land registry with the Department of Justice to verify insolvency is needed to avoid fraudulent transfers arising from insolvent estates.

Transfer arising from restoration of property to a rehabilitated insolvent

This type of transfer occurs when a person who has been rehabilitated (cleared) from insolvency has his ownership in the land restored” (Deeds Office, 2023). Automating processes to verify

the insolvency status with the DoJ&CD is required and the land registry will need to be integrated with the relevant systems.

Transfer arising from legal succession

“This type of transfer occurs when one legal entity or public entity is dissolved, and its property is passed on to its successor e.g., the assets of the South African Railways and Harbours were passed on to the Passenger Railway Agency of South Africa and Transnet respectively” (Deeds Office, 2023).

Transfer by virtue of expropriation

This transfer occurs where the state legally dispossesses a person of his land ownership for public purposes subject to payment of compensation and such land is registered in a particular state organ” (Deeds Office, 2023). Expropriation of land in South Africa is a burning issue at the core of the land reform programme. Having a tamper-proof land registry with historical property transaction data and information with the land valuations can assist in preventing some of the corruption and fraud around expropriation, since this is a process that can give rise to principal-agent and collection action problems. Without a reliable land registry, land expropriation can be subjected to abuse and ordinary citizens can become vulnerable.

Sheriff transfer at Auction

“This happens usually when there is a fore-closure on the property by way of warrant of execution” (Deeds Office, 2023). The land registry is also required to verify sheriff transfer court orders to avoid fraudulent transfers arising from auctions.

Verification of these property transfers or registering triggers from their main sources is crucial to detect and prevent corruption and fraud from happening. Land reform sustainability can only be achieved if there is a complete, secured, and reliable land registry that is integrated with various systems that record the property transfers triggers. Moreover, if the transfers or the

registering triggers’ main sources can also be made available electronically, the relevant verification processes can be automated and integrated with the blockchain land registry.

5.5.1 Deeds Transfer Process

Deeds transfer processes are currently paper-based and manually driven, and the current deeds registry system still allows for manual intervention which suggests that innovation and digital transformation is required for further automation. According to the Deeds Office, the transfer process depicts the reasons for wanting to transfer property with the associated key activities. The process has two major steps when the reason is to buy or sell: the conveyancing transfer activities and the deeds registration activities.

The current centralised conveyancing process places trust on conveyancers to collect and verify all the necessary documents. It is also currently paper-based and manually driven. The conveyancing process is at the core of the land registry processes and automating it will not only reduce conveyancing fees but will bring in more efficiencies and make it harder for corruption and fraud to occur, especially fraud enabled by making use of fraudulent documents. The Deeds Office’s digital transformation programme could consider automating the conveyancing process using blockchain technology innovation and leveraging unique features such as smart contracts to bring more transparency to the process which will improve the land registry as a public good.

Conveyancing Process
❖ Offer to Purchase and appointing a conveyancer
❖ FICA documents, bond cancellation figures and title deeds

❖ Obtaining clearance from the municipality, paying all costs (transfer duties, SARS fees and municipal rates) and signing transfer documentation
❖ Lodging all the necessary documentation with the Deeds Office

Table 5-2 Key Conveyancing Process (Source: Author's compilation from the Deeds Office Websites, Available: <https://www.deeds.gov.za/property-transfer-process.php>)

Step 1: Appointment of the Conveyancer

“It is by law that one must use a Conveyancer to transfer property, according to the Deeds Registries Act 47 of 1937” (Deeds Office, 2023). Conveyancers also receive a Sale Agreement or Offer to Purchase, normally from the estate agent. A review of the DRA is needed to ensure that the land registry becomes more accessible, which can result in more accountability. Decentralising the land registry through digital transformation using blockchain technology innovation could allow other stakeholders, such as municipalities, to lodge deeds and empower property owners, buyers and sellers with the resources, skills and knowledge to initiate a sale or purchase and to lodge deeds on the land registry. This will increase accessibility, bring more transparency, alleviate some of the current information asymmetry problems and possibly do away with the need to appoint a conveyancer for some of the transactions.

Step 2: Securing the Purchase Price and Fulfilment of Suspensive Conditions

In the case of the bonded transactions:

The conveyancer obtains the necessary guarantees regarding the bond. The conveyancer also obtains the bond cancellation figures and follows up on the bond approval conditions of the purchaser. The process may involve up to three (3) attorneys namely the transfer attorney (conveyancer), bond cancellation attorney and

the bond registration attorney.
(Deeds Office, 2023).

Property owners are currently burdened with several costs or fees throughout the sale process and these fees may not be feasible for low-income property markets such as the subsidised and affordable housing, and properties within communal land markets. Resale markets in this property market segment remain a challenge and are currently done informally because of the current inefficiencies and the need to appoint a conveyancer. Blockchain technology innovation could introduce smart or electronic contracts to automate the land and property which might reduce costs significantly. This could increase the land registry's accessibility and support land reform. The costs involved in the process will push some property owners to seek corrupt and fraudulent ways to bypass the formal administrative processes that come with hefty fees.

Step 3: Clearance (Rates Clearance Application Form and Rates Clearance application process)

The conveyancer also runs the clearance process:

“The Conveyancer will also request cancellation figures for: electricity, rates and taxes, and levies from the municipality and body corporate/homeowners association respectively.”

(Deeds Office, 2023)

Currently, this process is done manually. A land registry that is integrated with municipal systems will get rid of the manually driven processes that can help reduce fraudulent activities around rates and taxes clearance. A complete and reliable land registry will enable the government to recover lost revenue from many of the beneficiaries of subsidised houses who are currently not paying for rates, water and sewage. This recovered revenue can be ploughed back into the community to make the land reform process more sustainable.

Step 4: Drafting and Signature of Documents

The conveyancers draft the documents and signing is done in person:

The conveyancer (or attorney) prepares the transfer documentation once the suspensive conditions have been fulfilled and sends the draft deed and guarantee requirements to the bond registration attorneys. Both the purchaser and seller sign the actual transfer documents. The purchaser also signs off on the bond documents (if applicable).

(Deeds Office, 2023).

With blockchain smart contracts, the agreements can be automated to allow relevant parties to sign electronically, and signed agreements can be saved on a secured storage. This can help deal with fraudulent signatures and missing agreement.

Step 5: Payment of Costs/Guarantees

Money must be deposited to a trust account to pay for transfer costs, duties and outstanding rates and levies:

Payment for the transfer costs and transfer duties, outstanding rates and levies, value added tax if applicable, bond fees to the conveyancer trust account. Once this has been paid, the conveyancer will make payments to the relevant departments (and levies to body Corporate/homeowners association) and will obtain the clearances (rates clearance certificate, SARS transfer duty receipt, levy Certificate). The seller must pay for rates and taxes for four (4) months in advance and pay for the levies.

(Deeds Office, 2023).

These governance processes are currently done manually. An integrated land registry which also integrates with trust accounts to verify funds can make the process more transparent and reduce total dependency on the conveyancers. It also has the potential to reduce some of the

costs such as the conveyancing and estate agents' fees, and Deeds Office fees to access land registry records.

Step 6: Obtaining Compliance Certificates

As part of fulfilling the Offer to Purchase, various compliance certificates must be verified:

The Conveyancer will request for various certificates such as Electrical Compliance Certificate (Health and Environment Act), Electric Fence Certificate, Gas Certificate, and depending on the area may also request a Beetle Certificate, Plumbing Certificate, or Invasive Species Certificate. This is part of fulfilling the "offer to purchase". (Deeds Office, 2023).

Currently the verification of compliance certificates is also done manually and the possibility of recording some of the fraudulent certificates on the land registry conducted by bogus electricians and plumbers are very high. Without an electronic system wherein only qualified and vetted electricians and plumbers are allowed to issue compliance certificates, information asymmetries between the buyers and sellers will exist since the buyers, estate agents and the conveyancers will not know if the certificate was issued by the bogus electrician or plumber.

Step 7: Lodgement of Deeds and Documents

After everything else is done, the last step is to lodge the deeds and documents with the Deeds Office:

Once the payment of the purchase price is secured, the conveyancer will arrange with the bond registration attorneys and bond cancellation attorneys for simultaneous lodgement of the deeds to the Deeds Office. The deeds and documents are placed in the lodgement cover and a unique barcode is placed on the cover for tracking purposes. (Deeds Office, 2023).

The Offer to Purchase and supporting FICA documents such as identity documents, passports and marriage certificates, bond cancellation figures, court orders, wills, municipal rates and taxes clearance certificates and transfer duties are collected and requested by the conveyancers from various institutions. Because the process of collecting these documents is still paper-based and manually driven, these documents can be tampered with and, as a result, some of the elements of corruption and fraud can be enabled.

5.5.2 Deeds Registration Process

Deeds Registration Process
❖ Lodgement — 1 day
❖ Examination (1 st and 2 nd level examination) — 3 days
❖ Archiving — 9 days
❖ Execution (registration, preparation, black booking) — 3 days
❖ Delivery

Table 5-3 Deeds Registration Process (Source, Author’s own compilation from the Deeds Office Deeds Office, Available: <https://www.deeds.gov.za/property-transfer-process.php>)

According to the Deeds Office website, the current deeds registration process is estimated to take approximately 17 days:

Deeds and documents will be made available from within seventeen (17) days from date of lodgement, provided that all the documents that have been submitted are in

order.

(Deeds Office, 2023)

Through automation with blockchain technology innovations, this process can be reduced to just a few minutes, or simply fewer days if there is still a need to obtain consensus from all the key stakeholders involved through a decentralised, private, permissioned blockchain before finalising a property transfer.

Step 1: Lodgement

This process involves data preparation and distribution. Lodgement processes can be automated to empower various citizens and stakeholders to capture and upload the relevant documents.

Step 2: Examination

The Deeds Office's examiners examine the deeds in detail. Currently, this is a manual and paper-based process. Under the blockchain land registry, examiners could still monitor transactions online, and conduct thorough examinations and audits, where necessary. Since innovation and digital transformation will introduce major changes within the Deeds Office, employees such as the notaries and examiners will need to be retrained or upskilled to examine and audit deeds transfers online to guarantee the integrity of the land registry records.

Step 3: Archiving

Archiving entails numbering, capturing, scanning, verifying, and conducting other final checks on documents. Blockchain can provide secured storage and archiving, so other private players or third parties can also assist through PPIs, which will create multiple backups of this crucial data and information.

Step 4: Execution

During the execution stage, the Deeds Office processes the registration and prepares for black booking.

Step 5: Delivery

The Deeds Office delivers the final title deed. Currently, the final, paper-based title deed is issued to the property owners (and the banks, in the case of bonded transactions). With blockchain, tamper-proof electronic title deeds can also be generated and emailed to owners. Interfaces can also be developed for owners to generate the title deed electronically from time-to-time as the need arises.

The current land registry provides robust paper-based and manual checks and balances to ensure the integrity of the land registry and to prevent some corruption and fraud issues. However, the current process takes long, negatively impacts the implementation of land reform and can also create room for corruption and fraud. With digital transformation, some of the processes can be automated to help fast track the title deeds registration process and prevent processing delays, which may be the root cause for some of the corruption and fraud.

5.6 Land Registry Processes and Systems

5.6.1 Current Land Registry Systems

The Deeds Office has already developed an online web application:

Web-based application used to provide all registered users with property information stored on the Deeds Registration System (DRS), including tracking status for all transactions within the deeds registration process. This application further provides

users with a platform to perform different searches and provides search results by generating reports that are available to the client at a specific cost. This application can also be accessed via the internet through desktops, Android or IOS internet enabled devices.

(Deeds Office, 2023)

The following is some of the information that you can retrieve using the DeedsWeb application:

The registered owner of a property; Interdicts and contracts in respect of the property; Purchase price of the property; Rules of a sectional title scheme; Copies of title deeds documents, Anti nuptial contract and sectional title plans.

(Deeds Office, 2023)

According to the Advisory Panel on Land Reform and Agriculture (2019), an amendment to Regulation 18 of the DRA is required. This regulation enables the Registration Regulation Board, upon approval by the Minister, to make regulations prescribing “the manner and form of identity of persons”. Currently, the Act makes provision for the “name, ID number, date of birth or registered number to be recorded in the Deeds Registry and the panel recommended that the status of citizenship, nationality, permanent residence status and gender, race, SA ID number, foreign passport number, company registration number, income tax number, VAT registration number, nature of shareholders, Trust registration number and nature of beneficiaries to be disclosed” (Advisory Panel on Land Reform and Agriculture, 2019).

The land registry needs to provide sufficient data and information that will be useful in conducting corruption and fraud investigations by law enforcement agencies like the SIU, NPA and SAPS. Land registry data and information can also assist key government stakeholders such as the DALRRD and DHS to monitor and report on the land reform programmes’ implementation progress.

To ensure that the land registry is complete and reliable as a public good, the Advisory Panel on Land Reform and Agriculture (2019) noted that amendments to the DRA through an enactment by Parliament will be required as existing owners will need to make declarations and disclosures similar to what is expected of future owners under an updated Regulation 18. The amendment must deal with the compulsory identification of owners, a verification system of landowners, accurate and reliable record keeping, monitoring mechanisms, and the procedure for forfeiture of land to the State where there is non-compliance.

For the land registry to assist in dealing with inefficiencies, corruption and fraud going forward, an inclusive and complete land registry is a starting point and can only be possible if all properties and land have been assigned an identified legitimate owner and the owner has been verified and vetted.

5.6.2 Current Land Registry Integration Capabilities with other Third-Party Systems or Service Providers

“Blockchain would help by making all land records publicly available online and eliminating multiple titles for the same piece of land”, according to Peter Tole, head of Land Layby Group, a Nairobi-based real estate firm (Mwanza and Wilkins, 2018). The Deeds Office provides an Application Programming Interface (API) to interested third parties wanting to integrate their systems or applications with the DRS. There are already a few third-party applications such as Lexis WinDeed, SearchWorks, Deeds Office Online, and MyDeedSearch currently making use of web services via APIs.

[The] Deeds Registration System (DRS) provides application programming interface to clients that require application to application interface to Deeds data. This enables external users to have their applications directly connecting to Deeds Registration

System and performing searches as per specified web service functions.
(Deeds Office, 2023)

Third-party platform service providers extend the Deeds Office's services by increasing accessibility to deeds, property data and information, and conducting further analysis and research. The motivation behind the establishment of the third-party deed search solutions is because of the current inefficiencies within the Deeds Office such as the long queues, delays, and long turnaround times when it comes to service delivery. Another motivation is because of the lack of advanced functionality within the DRS that various users can use to gain insights and make informed decisions around land registry data and information, land reform or the real estate sector. Third-party service providers identified an opportunity to provide online services.

According to MyDeedSearch, with the current service levels at the Deeds Office at an all-time low, they are providing a superior service and fast-becoming the preferred portal for deeds and property information for the general public and property professionals. Moreover, Deeds Office Online indicated that:

Traditionally people would go to the relevant Deeds Office (Cape Town, Pretoria, Johannesburg, Pietermaritzburg, Limpopo, Bloemfontein, King Williams Town, Kimberley, Vryburg, Mpumalanga or Umtata), stand in the queue, pay the prescribed fee, wait a few hours and receive the information, all of this is a time-consuming process and if clients do not reside close to the Deeds Office where the information is registered; clients can now do all of this from the comfort of their home or office and the good thing is that they cover all 11 Deeds Offices electronically.
(Deeds Office, 2023).

Other capabilities include bulk data requests via email and weekly and monthly subscription. Bulk data requests via email services are also available to users who require bulk information

but do not necessarily have applications that can use the APIs to connect and retrieve necessary information.

Users are also expected to have a Deeds Web account to use the platform and they pay a fee for utilising the service. Big clients such as municipalities have weekly and monthly subscriptions to ensure that they have the latest property ownership information within their jurisdiction. Furthermore, they also have Deeds Web accounts for billing purposes, and they have a clearly defined record set that they are interested in. The retrieval of the information they require, whether on a weekly or monthly basis is scheduled to run as a batch process and the information retrieved is then emailed to the relevant clients every day of the week or every day of the month. (Deeds Office, 2023)

Interviewee #3 (2021) also confirmed the fact that conveyancers and estate agents pay a fee to use third party deeds and property search online systems:

We use a system called Search Works. I know some of the agents use a company called Lightstone and they have access to the data that is recorded at the Deeds Office. (Interviewee #3, Zoom Interview, June 2021).

The current relationship between third-party service providers and the Deeds Office regarding the use of the land registry is another form of decentralisation of the land registry through PPIs wherein the private sector also intervenes and collaborates with the Deeds Office to strengthen the public good. However, this interplay between the Deeds Office and the third parties only provides land registry accessibility to users such as conveyancers and estate agents with a payable fee. This means that most property owners or citizens will not be able to access the land registry public good using the current third-party service providers interfaces.

Blockchain could further enhance and expand the current PPIs, so that third parties can also provide interfaces to empower property owners, conveyancers, and estate agents to lodge the deeds instead of just conducting deeds and property searches. However, the payable fees will need to be reviewed and regulated to ensure that the land registry is inclusive and accessible by the rest of the population if the third-party service providers are also going to cater for the low-value property market segments.

5.7 Conclusion

It is fair to say that the Deeds Office has robust checks and balances in place to ensure the integrity of the records in the land registry. However, there are still a lot of inefficiencies, challenges, and issues around the processes outside and within the Deeds Office and the land registry. The majority of these inefficiencies can be addressed by automating the current manual and paper-based processes by integrating the land registry with other key stakeholders' systems.

Currently there are laws that ensure that there is effective governance around the land registry to accommodate the residential, agricultural, and commercial property markets. Land reform programmes are also supported by various laws such as the Sectional Titles Act of 1986, which recommends the registration of the sectional title deeds to the land registry, the Alienation of Land Act 68 of 1981, the Restitution of Land Rights Act 22 of 1994 and the Upgrading of Land Tenure Rights Act, 1991, which promotes security of tenure within communal land. However, because the DRA still requires the lodgement of deeds to be done through conveyancers, this has a negative impact on other real estate market segments such as the subsidised and affordable housing markets wherein beneficiaries cannot afford to pay the associated fees. The DRA also mandates the Deeds Office as the sole custodian of the land registry and as a result reduces transparency by limiting the involvement of other stakeholders in the process. With blockchain technology, the same copy of the land registry can be accessed by various key stakeholders such as banks and municipalities housing departments so that they could participate in the

administration thereof. Drawing on the conceptual framework in Chapter 3, this chapter investigated the existing institutional arrangements, their interactions and relationships within the land and real estate sector through document analysis to understand the current governance inefficiencies. Various laws that shaped land governance since 1994 were introduced to promote good governance for more inclusivity and accessibility as described by the United Nations (2009) and more importantly to support land reform, better property management and land restitution. This chapter also observed that since 1994 key laws were introduced to also improve existing structures, processes and technologies in line with the latest technological trends or advances and land governance best practices. It also highlights the gaps that exist and that can be addressed using technology innovation such as blockchain to enhance the Land Registry as a public good.

CHAPTER 6: QUALITATIVE FINDINGS, DISCUSSION AND ANALYSIS

This chapter highlights key findings from the study interviews based on the interviewee's answers, views, and opinions. The primary research objective is to investigate how the land registry can be enhanced to fulfil its critical role as a public good in safeguarding constitutionally protected property rights and constitutionally required administrative justice and land reform, as well as what mechanisms would be required for it to become more effective and efficient and less susceptible to corruption and fraud. It specifically explores the role of PPIs and blockchain in achieving these outcomes.

This thesis investigates if effective governance using blockchain technology can support land reform and assist in dealing with the corruption and fraud currently affecting the land reform programme's implementation progress. The secondary research objective is to investigate effective governance policies and regulations that can facilitate the real estate sector and land registry digital transformation necessary for the adoption of a more inclusive, complete, secure,

decentralised blockchain land registry public good to assist in dealing with corruption and fraud in South Africa and to help fast track land reform programme implementation.

Various key themes and patterns emerged from the coding of interviews. The interviews were conducted with identified and sampled institutional role players with a vested interest in and regular interactions with the land registry within the land and real estate sectors. The interview questionnaires focussed on eight main areas of investigation to assist in answering the research questions, namely:

- 1 Institutional analysis of land reform governance
- 2 Institutional analysis of corruption and fraud in the real estate sector
- 3 Land governance and its impact on the Deeds Office and the land registry
- 4 Decentralisation for effective governance by increasing accessibility, transparency, inclusivity, and accountability
- 5 Technology innovation for effective governance by enhancing accessibility, security, transparency, auditability, and reliability by adopting blockchain technology
- 6 PPIs for effective governance in delivering and operating the blockchain-based land registry as a public good
- 7 Digital transformation for effective governance to drive the transformation of the Deeds Office, and the implementation and adoption of the blockchain land registry public good by facilitating change management, awareness, and training
- 8 Possible effective governance policy and regulation reforms to enable decentralisation and the integration of blockchain into the land registry.

6.1 Key Findings

6.1.1 Land Reform Governance

Interviewee #4, #5, #13 and #14 (2021) and Interviewee #12 (2022) suggested that there are currently inadequate and ineffective governance controls to guarantee an increased level of transparency, accessibility, and auditability around land reform and RDP-subsidised and affordable housing beneficiary registration, application and allocation processes due to the current manual and paper-based processes.

Interviewee #4, #5, #10, #13 and #14 (2021) and Interviewee #12 (2022) also highlighted the current title deeds backlog for RDP-subsidised houses as one of the major problems affecting land reform in the subsidised housing market, which caters for the poor majority of the population. This constitutes weak governance and effectively means that property and land belonging to the poor are currently not adequately protected, as highlighted by the FAO (2007). Furthermore, the weak land governance is, in contrast with the suggestions of Khan (2004), who argued that states have to protect stable property rights. Weak governance could also render land reform ineffective and reverse all its intended.

Evidence from the interviewees also suggests that key political institutions, such as municipal housing departments and the DHS, involved in the subsidised and affordable housing markets are using fragmented systems and processes with an element of duplication of effort which further contributes to poor management of land reform programmes (Interviewee #4 and #5, 2021).

6.1.2 Corruption and Fraud

Interviewees #10 and #13 (2021) noted that, although there is corruption and fraud within the land and real estate sectors in South Africa, the problem was generally not severe. Interviewee

#12 (2022) and Interviewee #13 (2021) argued that despite the potential of technology assisting in dealing with corruption and fraud, principal-agent and collective action problems normally happen between humans (i.e. between buyers, sellers and communities themselves). Interviewees #13 and #16 (2021) also argued that some corruption and fraud activities are committed outside the land registry governance processes and, as such, they cannot be detected and prevented by the land registry system nor by technology innovations therein. Interviewee #13 (2021) further argued that if humans have agreed to engage in corrupt or fraudulent activities, systems can also be manipulated to enable corruption or fraud if there are weaknesses and inefficiencies.

The majority of the interviewees revealed that there are various forms of corruption and fraud within the land and real estate sectors, as highlighted by Transparency International (2016). They suggested that people such as traditional leaders, buyers, sellers and institutional actors such as estate agents, conveyancers, developers, valuers, councillors, and government officials (as mentioned by Koechlin, Quan and Mulukutla (2016)), depending on the nature of a transaction, are involved in corruption and fraud.

Interviewees, particularly the estate agent (Interviewee #2) and the conveyancer (Interviewee #3), suggested that cash transactions are more likely to have elements of corruption and fraud compared to bonded transactions wherein banks have additional checks and balances such as the FICA process to ensure that they do not lose money by granting loans to bogus buyers or fraudsters.

Furthermore, Interviewee #7 (2021), a Registrar within the Deeds Office, and Interviewee #10 (2021) of the Banking Association of South Africa (BASA) also indicated that, although corruption and fraud does occur from time to time, the current land administration and management processes within the Deeds Office, the land registry and other key stakeholders such as banks, CIPC, DHA and SARS are adequate and robust, with necessary checks and

balances that assist in detecting and preventing fraud. However, this is not the case with the low-value properties such as RDP houses, wherein there is a title deeds backlog and inefficiencies such as manual and paper-based beneficiaries' waiting lists and allocation processes, and an absence of security of tenure for properties within communal land and informal settlements.

The estate agent (Interviewee #2) and the conveyancer (Interviewee #3) also highlighted the fact that cash transactions do not go through the rigorous vetting process of bonded transactions and these can easily be subjected to corruption and fraud. For example, banks conduct the FICA process for bonded transactions which reduces a lot of fraudulent transactions. SARS ensures that buyers and sellers pay taxes which assists in verifying the legitimacy of the transactions. In the case of a company purchasing land or property, company documents can be verified with CIPC. However, Interviewees #3 and #4 (2021) suggested that there are weak controls and inefficiencies within government entities such as municipalities, departments of housing, provincial human settlements departments and the national DHS affecting the implementation of the land reform programme that can also enable corruption and fraud.

Interviewee #11 (2021), from the PPRA, argued that some of the fraud elements occur due to lawlessness within the communities. For example, some communities illegally evict rightful owners from their properties and protect community members who are not rightful owners when there are new resales, especially within townships and informal settlements.

Interviewee #1 (2021), from Corruption Watch, and Interviewee #10 (2021), from BASA, also highlighted some of the challenges which negatively impact the land reform programmes. They indicated that the lack of security of tenure and title deeds for properties within communal land are vulnerabilities for corruption or fraud. This is because the communal land is owned by traditional leaders through community trusts. There are allegations that traditional leaders seek bribes and engage in other acts of corruption such as sextortion when dealing with women in

need of the land within their communities. This also makes it difficult for the government to deal with corruption and fraud within the informal settlements property market segment.

Interviewee #1 and #6 (2021) indicated that corruption and fraud cases normally take longer to be investigated due to frequent changes of investigators and the nature of complexity of the cases which sometimes can degenerate into collective action problems and result in systemic corruption. For example, traditional leaders, councillors, surveyors, developers, conveyancers, and Deeds Office officials such as notaries and examiners could collude and have a government-owned piece of land sold to a private buyer at a price way below the market or at price way above the market to accommodate bribes that can be shared amongst the actors involved.

Interviewees #3 and #4 (2021) also indicated that the current inefficiencies, such as title deeds backlog and manual and paper-based subsidised housing processes, also enable corruption and fraud due to the fact that government officials such as councillors, DHS officials and municipal housing department officials can manipulate the beneficiary allocation processes. This is enabled by the exchange of documents, such as Excel spreadsheets, being passed from one department to another and due to a lack of a system that consolidates the government subsidised housing beneficiary application and allocation processes.

6.1.3 Decentralisation for Effective Governance

The majority of the interviewees trust the Deeds Office and believe South Africa has got a reliable DRS that is aligned with international best practices. They also voice their confidence towards the Deeds Office and do not think there is an issue with the current Deeds Office mandate.

Moreover, Interviewee #6 and #13 (2021) argued that it might not be in the best interest of every stakeholder to play a role in a decentralised environment due to their specific mandates.

However, the Deeds Office interviewees, in particular Interviewees #6 and #7 (2021), suggested that the Deeds Office is already decentralised because there are Deeds Offices in every province in the country. The fact that the Deeds Office is already decentralised is evidence to say that there is already a foundation for good governance, as argued by Ali (2008). Interviewee #6 (2021) further suggested that the Deeds Office can still expand its decentralisation model by introducing satellite offices in other underserved remote areas which will increase accessibility of the services to the rest of the population. The current decentralisation model is in contrast with true decentralisation wherein there is no centralised political institution like the Deeds Office, as described by Atzori (2017).

Interviewees #2, #3, #6 and #13 (2021) also indicated that in order to access the land registry information, users need to pay a fee which also prevents the majority of the population from using it. However, Interviewees #6, #10 and #13 (2021) agreed that decentralising the land registry could bring more efficiencies, and make its services more accessible and affordable to the rest of the population.. Decentralisation could further enhance land registry governance, but the Deeds Office will still play a key role to regulate and enforce the rules. This resonates strongly with Swan (2015) and Bennett et al. (2021), who argued that decentralisation using blockchain does not mean to dismiss the State but to foster better governance and there is still the need for the governance of organisations within a blockchain network.

6.1.4. Digital Transformation for Effective Governance (Implementation of the Blockchain-Based Land Registry)

Interviewees #5 and #6 (2021), both of the Deeds Office, called for an integrated DRS with all key stakeholders having direct interface with the land registry to do away with the current inefficiencies such as the current manual and paper-based processing, deed transfers delays and long processing times, all of which enable some corruption and fraud elements. Interviewees #5 and #6 (2021) indicated that digital transformation within the Deeds Office was already

underway, starting with the digitisation of the existing paper-based deeds transfers and title deeds documents and that blockchain deployment and initiatives will strengthen the Deeds Office institutional capacity, in line with Zambrano (2017).

The request for an integrated land registry is also aligned with the Deeds Office's existing plans, and Interviewees #5 and #6 (2021) indicated that the Deeds Office is looking into developing an integrated land registry as part of the land registry digitisation programme required by the EDRSA. Moreover, Interviewees #3, #6 and #13 (2021) recommended that it is not just the Deeds Office that needs to go electronic but all other key role players and partners that interface with the land registry so that they can also be integrated with the land registry and form part of the end-to-end process without manual intervention. Interviewee #3 (2021) cited SARS as one of the institutions already offering services online and Interviewee #2 (2021) expressed that delays are experienced within various municipalities due to the current manual and paper-based processes.

Due to the nature and complexity of the land and property purchasing processes, some interviewees, such as estate agent (Interviewee #2) and the conveyancer (Interviewee #3) argued that, despite the digitisation and automation of the land registry, there is still a need for human intervention to conduct necessary checks and balances and to walk hand-in-hand with buyers and sellers throughout the process. This evidence suggests that a hybrid solution, where both technology and professionals such as estate agents and conveyancers are still involved, could be a possible arrangement as an outcome of digital transformation within the Deeds Office.

Interviewees #13 and #14 (2021) argued that adopting a technology such as blockchain can provide a low-cost, secured storage for deed transfer documents and has the potential to provide title deeds for low-income property markets such as properties within the townships, communal land and informal settlements. Moreover, Interviewees #6, #13 and #14 (2021) also believe that

blockchain can make the conveyancing and title deeds registration processes cheaper and can help deal with the current title deeds registration backlog for government-subsidised housing .

Although blockchain can potentially open up the land registry administration and access to the public at large by empowering stakeholders such as buyers and sellers to initiate transactions without relying on the estate agencies or conveyancers, Interviewee #6 (2021) of the Deeds Office and Interviewee #13 (2021) of CAHF argued against decentralisation through a public blockchain where anyone can be given the rights to lodge and register title deeds, arguing that this might actually result in chaos. Interviewee #13 (2021) suggested that the best possible blockchain deployment model could be the private, permissioned blockchain whereby key selected stakeholders with the relevant mandate can co-manage the land registry together with the Deeds Office. In contrast to the views of Interviewee #13 (2021) and in defence of the Deeds Office's current mandate, Interviewee #6 (2021) argued that if other institutions such as the banks can be allowed to process deeds transfers, then they should also be allowed to provide citizens with IDs as well.

6.1.5 Public-Private Interplays for Effective Governance

Evidence suggests that PPIs already exist with key private sector institutions such as banks, who already play a critical role and provide some checks and balances that assist in detecting fraudulent transactions. Moreover, evidence also suggests that PPIs have enabled stakeholders such as estate agents and conveyancers to use third-party systems developed by private sector companies such as Search Deeds and Lightstone to access the land registry. This suggests that there is already some form of PPI between the Deeds Office and some private sector institutions. Therefore, the blockchain institutional arrangements could further leverage the existing PPI arrangements.

Furthermore, evidence suggests that both the private sector and the public sector are already involved in the blockchain land registry pilots. For example, interviewees #13, #14, #15 and #16 (2021) and Interviewee #12 (2022) were involved in the blockchain land registry pilots and indicated that private sector stakeholders from the financial services sector, such as the Mastercard Foundation and 71Point4, not-for-profit organisations, such as CAHF, blockchain technology solutions providers including telecommunications service providers, and public sector stakeholders, such as government departments and municipalities, are collaborating through PPIs for the delivery of pilots to test the feasibility and viability of blockchain for the use case.

This is an indication that the private and public sector collaboration could drive innovation and digital transformation for land governance and the land registry through PPIs. This is in line with Tosun, Koos and Shore's (2016) views on co-governance and Kaul, Grunberg, and Steyn's (1999) suggestions that any collaborations should not have any contractual obligations.

Interviewee #13 (2021) and #12 (2022) argued that, before adopting the blockchain-based land registry, existing administration issues need to be resolved first, such as the current title deeds registration backlog, which is not only about registration of title deeds in the land registry but involves the complex process of verifying the original beneficiaries and the current occupants.

6.1.6 Blockchain Technology Innovation for Effective Governance

Interviewees #14, #15 and #16 (2021), who all work with blockchain technology, indicated that blockchain technology has not yet been formally adopted post successful pilots by most governments. However, interviewees further argued that blockchains pilots have demonstrated that blockchain can offer more benefits in terms of efficiencies and cost savings, can provide tamper-proof transactions to support land reform and can also assist in dealing with corruption and fraud (Interviewees #14, #15 and #16, 2021).

Interviewees further indicated that the delays in terms of adopting and integrating blockchain with the land registries is because some stakeholders within the land and real estate sector including government officials fear that they might lose jobs, which is a general fear whenever there are technological changes (Interviewees #14, #15 and #16, 2021). To alleviate the job loss fears that public officials have towards innovation using technologies like blockchain, the best approach would be for the Deeds Office to motivate to government that blockchain technology is complementing or supplementing existing governing processes while also promoting innovation within the public sector, as recommended by IDRC (2017).

6.1.7 Policies and Regulations Reforms for Effective Governance

Interviewees #2, #3, #5, #6, #10 and #13 (2021) indicated that, currently, transfers of immovable assets such as land and property cannot be done using electronic signatures. These regulations remained even after the global COVID-19 pandemic, which disrupted many sectors. Interviewee #5 (2021) indicated that there was a backlog because deeds transfers could not be concluded electronically.

As Sladic et al. (2021) concluded, blockchain deployment should contribute towards reducing costs. Interviewee #6 (2021) also argued that if municipalities and banks are allowed to have their own in-house conveyancers or conveyancing units, it could remove the costs of conveyancing for property transfers and title deed registrations for low- and middle-income properties, which will benefit the majority of the population.

6.2 Deeds Office and Land Registry Political Settlements (Key Role Players, Their Powers, Relations, and Interests)

The governance processes around the land registry involve several key stakeholders or actors with various interests such as community members, subsidised housing beneficiaries, traditional leaders, premiers, councillors, subsidised housing administrators, municipal officials

and property developers. According to Interviewee #5 (2021), there are several stakeholders involved in the land reform programmes such as the subsidised and affordable housing projects, including communities or citizens themselves:

We form a project steering committee with all stakeholders who will be involved and normally it will be the subsidised housing administrator, the developer, the construction guys. There will be city officials, there will be officials from the province and, from time-to-time, at certain stages we will engage the councillors, just at certain stages when we do the project plan, introduction phase. We will have community consultation via the councillors, and they ought to say to the beneficiaries we have a housing project for you.

(Interviewee #5, Zoom Interview, June 2021)

It is clear from the views of Interviewee #5 that communities or citizens should be involved from the start. This is vital, as Johnston and Kpundeh (2002) indicated, because many societies have limited corruption through the broad-based mobilisation of a diverse range of citizens. Keeping records such as attendance registers for future reference to verify who has been on the waiting list could assist the government to keep track of the allocated beneficiaries and the beneficiaries yet to be allocated in a fair and transparent manner.

6.2.1 Key Role Players

6.2.1.1 Estate Agencies

A conveyancer suggested that one of the key stakeholders is an estate agent who plays a critical role from the beginning of each transaction and facilitates transactions between buyers and sellers. Their role is vital in terms of the initial verification of both the buyer and seller, and they are better positioned to detect any potential occurrence of corruption and fraud firsthand or earlier in the process:

The attorney does not conclude the transaction between the sellers and buyers. It is done through an estate agent, so the estate agent accepts the offer, the conveyancer gets appointed once that transaction is concluded, so no verification is done by the conveyancer of who the buyer is or who the seller is, that is what the agent does, when they get instructed by a willing seller and willing buyer.

(Interviewee #3, Zoom Interview, June 2021)

Estate agents are also responsible for the trust accounts that hold money for a buyer during the sale of property and which are used to pay for things like transfer duties and municipal rates:

We have estate agents that are responsible for keeping trust monies that belong to clients during your transactions, your purchase of property, and they are supposed to then keep these monies in a trust account.

(Interviewee #11, Zoom Interview, July 2021)

The new blockchain land registry could empower buyers and sellers with resources, skills and knowledge about the selling or buying processes so that they can save costs and be able to conclude sale agreements online, without relying on estate agencies.

6.2.1.2 Subsidised and Affordable Housing Administrators

When it comes to low-cost housing or government-subsidised houses, estate agents are not involved; instead, municipalities appoint a subsidised housing administrator who is an independent contractor or professional to work together with the municipality's officials:

Developers will approach us, or municipalities will approach us and say we have a project planned, now let us investigate who are the potential beneficiaries for this project, then we will go and do full economics study and profiling of communities.

(Interviewee #11, Zoom Interview, July 2021)

Although the objective of the appointment of an independent subsidised housing administrators is to provide the necessary governance processes to guarantee the implementation success of the subsidised housing projects in a fair and transparent manner to support land reform, government officials can still influence and interfere with processes. Therefore, subsidised housing administrators are likely to initiate the principal-agent problems or collective problems by colluding with other actors such as government officials.

6.2.1.3 Conveyancers and Attorneys

Central to the land registry and Deeds Office processes are conveyancers or attorneys who prepare deeds for lodgement with the Deeds Office. This was also confirmed by various stakeholders that interact with the Deeds Office. One of them was the estate agent, who responded by saying:

As a sales agent my job is to find a buyer, once that offer is signed by the seller and the buyer, I hand it over, that is now out of my hands, it's up to the attorneys, and I then rely on the attorneys to update myself as well as the buyer and the seller, all the parties involved. I don't necessarily need to know every step of the way; I just need to know if progress is happening, and the transaction is moving forward and the attorneys send us weekly updates, which I rely on, and which the clients rely on, which is generally sufficient.

(Interviewee #2, Zoom Interview, March 2021)

Interviewee #8 (2022) highlighted the fact that the conveyancing fraternity is at the centre of the real estate sector's property buying and selling processes:

The current system does not present the owner of the property directly to the Deeds but rather the conveyancing fraternity is responsible for representing a buyer or a seller in that regard. The system takes on the conveyancer having been given, let me

say, trust by the Deeds, but also legally, what the conveyancers gives you, it is assumed to come from the rightful person, because they are the ones that sit with the buyer and a seller to sign and also hand over lot of them the rights for them to make decisions on behalf of the buyers.

(Interviewee #8, Zoom Interview, March 2022)

Furthermore, in terms of the legislation, the role of conveyancers is also enshrined within the DRA:

In terms of our legislation, there is an intermediary between the Deeds Office and the client, and that intermediary is the lawyer. The only person who interacts on behalf of a client is a lawyer specialising in transferring immovable property and that person is called the conveyancer.

(Interviewee #7, Zoom Interview, August 2021)

Another key actor with keen interest in the land registry, the BASA also expressed confidence in the conveyancers as one of the key professionals regarding land registration processes:

Property is more than just a home, there are a whole lot of legalities outside, you got fraction of servitudes, you got your Sectional Titles Act there for common property exclusive use, and then the actual portion that the owner owns... property is quite complex and you actually need someone professional to provide you with a necessary oversight around what the attributes of that property are.

(Interviewee #10, Zoom Interview, December 2021)

Moreover, Interviewee #11 (2021) added that:

The conveyancers are mostly involved, even the estate agencies themselves don't have a relationship with the Deeds Office, it is the conveyancers.

(Interviewee #11, Zoom Interview, July 2021)

According to Interviewee #3 (2021), after being handed the transaction agreement known as the Offer to Purchase, conveyancers verify both the buyer and the seller:

We verify the authenticity of the information that we have and, under oath, they confirm that it is correct.

(Interviewee #3, Zoom Interview, June 2021)

Based on the current mandate bestowed to conveyancers, there is not enough transparency. The lodgement of deed transfers and title deeds registrations are handled solely by conveyancers and Deeds Office officials such as notaries and examiners without any visibility for other key stakeholders or actors. Moreover, the conveyancers also deal with other stakeholders such as municipalities, SARS and CIPC. These engagements and the associated processes are currently manual and paper-based, and the current inefficiencies can enable corruption and fraud because of the lack of transparency and audit trail around the processes. Furthermore, due to the lack of an audit trail around the transactions and processes, the current land registry cannot produce sufficient and reliable data and information that can assist with corruption and fraud investigations.

Conveyancers play a critical role in the buying and selling process. However, with an integrated blockchain land registry, some of the manual and paper-based processes executed by the conveyancers could be automated. This could make it easier for property owners or other stakeholders acting on behalf of low- and middle-income owners to run certain processes. This might also help reduce or remove the dependency on conveyancers. Furthermore, automation using blockchain technology could also bring more transparency around the conveyancing

process and could also prevent principal-agent and collective action problems involving conveyancers.

6.2.1.4 Deeds Office Officials (Examiners and Monitors)

After the conveyancer's lodgement of the deeds, Deeds Office examiners examine the deeds before processing the registration:

Before we register, three people must go through each document, you got your first examiner, who is going to do elementary examination, you got your second level examiner, now this second level examiner is someone with legal qualification, you cannot examine deeds if you don't have a legal qualification, then you got your third level examiner called a monitor, who is going to check if correct standards were made and so on.

(Interviewee #13, Zoom Interview, August 2021)

Interviewee #19 (2021) indicated that monitors first check the examiner's experience levels and recommend relevant training schedules to upskill the examiner:

First thing first, when you get the deeds, you need to check the experience of these examiners, you must first consider the level of experience. If the examiner is inexperienced, the monitors get the statistics to check how many deeds have been passed and how many deeds have been rejected pertaining the examiner and recommend the relevant training schedules.

(Interviewee #19, Zoom Interview, August 2021)

Moreover, monitors perform various checks after the senior examiner has completed the examination of the deeds transfer:

After the senior examiner is done with the examination, it goes to the monitors to check whether the examiners have done their work properly. As a monitor, I check the standard of the examination. First check uniformity, check the linking of the deeds, check the quality of a paper before it gets scanned, check the notes regarding the rejection to check if the rejection is warranted, you look at the legislatures, look at the standard of electronic data capturing and microfilming.

(Interviewee #19, Zoom Interview, August 2021)

According to Laabari and Chegri (2022), blockchain has significant promise in helping to reduce both economic and social impacts on the transaction process. The current deed examination process and the process that monitors conduct to review the examination of the deeds is still paper-based and manually driven and, through the Deeds Office's digital transformation, could be automated by blockchain. This could also reduce the number of days needed to complete the deed transfer significantly, especially title deed registrations, and increase the productivity and performance of the land and real estate sectors in general. However, monitors could still manually check and conduct verifications such as looking at the reasons for rejections and looking at the legislatures to make corrections and to take the necessary remedial actions.

6.3 Land Reform Subsidised (Reconstruction and Development Programme) Houses and Subsidised Affordable Housing

6.3.1 Title Deeds Backlog and Illegal Transfers

The current land registry is incomplete, uninclusive, and inaccessible by the majority of citizens due to a lack of title deeds for subsidised houses, which is a root cause for some of the current inefficiencies in the low-value property market. The subsidised housing administrator (Interviewee #5, 2021) also suggested that problems occur because of the time it takes to

allocate a beneficiary and keep up with changes in the process, including illegal resales of subsidised houses:

Lots of beneficiaries know that they are going to get an RDP house and they will already go and sell it even without paperwork. That is the main thing, that RDP house is sold, what people pay for the teeth and an affidavit at the police station is sufficient for them and you will not see the receipt with an affidavit to say here I paid R5 000 and whatever, so we had hundreds of affidavits presented to us to say here is the affidavit I bought this house, this is from Mr so-and-so, so the concept of ownership for RDP housing means nothing to beneficiaries, there is no respect for it. If they get a key to that house and they get the affidavit to say I bought this house, they are happy. (Interviewee #5, Zoom Interview, June 2021)

The subsidised housing market is not only faced with corruption and fraud risks because of the current manual, paper-based and un-auditable beneficiary allocation processes but also with governance failures such as the current title deeds backlog. As part of the land reform programme, the government initiated the RDP, part of which had the remit to build subsidised houses for poor and disenfranchised sections of the population.

A key objective of the subsidy programme was that beneficiaries who received a house on an ownership basis would receive the title deed to the property. While the initial intention of the housing subsidy programme was to provide shelter for poor citizens, by early 2000, the concept that the house should also be an asset was introduced. Accordingly the title deed was seen as critical to ensuring not only security of tenure, but also so that poor households could use their house as an asset to build wealth and such properties could contribute to the operation of the property market (Urban LandMark, 2011). The current title deeds backlog has rendered the subsidised housing market a failure relying on dubious processes that cannot be verified in

future thus jeopardising the little progress made with land reform. This is also forcing beneficiaries to sell their properties in an informal market when they resell subsidised houses.

The informal market is currently characterised by fraudulent activities whereby subsidised houses are sometimes sold to people that do not fit into the government's qualifying criteria. For example, some of the buyers are undocumented foreign citizens. Other buyers lose their money when they get evicted by family members or communities who suggest that the seller was not the rightful owner of the property. Due to the lack of proof of property ownership records and title deeds and the lack of a single view of subsidised housing ownership information (there are two different systems capturing ownership information, namely the Housing Subsidy System (HSS) and the land registry), these fraudulent activities cannot be easily detected, prevented, investigated, or traced to ensure that there is justice and the government land reform programmes such as the housing subsidy are serving their intended beneficiaries.

Furthermore, Urban LandMark (2011) argued that:

The value of a title deed is that it protects title to a property and facilitates market and financial transactions and its functions is to protect rights, records changes, facilitates property transactions and to facilitate financial transactions. In addition, title deeds are important as they provide individuals with an address, recognise the owner and their family as being part of the municipality and enable ownership of the property to pass on to family members in the event of death, and from a municipal perspective, ownership obliges the owner to pay property rates and service charges for services received, thereby contributing to its ongoing sustainability, (Urban LandMark, 2011)

Due to the lack of an inclusive, secured, transparent, auditable, complete, and reliable system, beneficiaries of subsidised houses have now created an informal secondary market and are trading their houses using affidavits, against government regulation. This is possible because the government has lost track of who owns the property and resale transfers are not recorded in the land registry. This is a recipe for more corruption and fraud, reversing the gains and targets the government seeks to achieve with its land reform programme. Bypassing the formal systems will further create a fertile environment for corruption and fraud exacerbated by lack of a reliable system. Interviewee #5 (2021) indicated that another reason contributing to the delays of title deeds registration stems from the fact that beneficiaries try to avoid being legally registered as owners to avoid paying for municipality services:

A title deed at the end of the day to them means nothing, because they know the moment they are going to have property transfers to their name, there is two issues - arrears rates on the property, they need to now have water and electricity to be transferred into their names which they can't do without proof of ownership, so it's a financial vicious circle, that's why they would rather illegally buy the house, keep it, and the other person who sells it, he is not too concerned about electricity, water, rates and stuff.

(Interviewee #5, Zoom Interview, June 2021)

Interviewee #20 (2021) pointed out that informal transfer is illegal, and it excludes some of the properties from the land registry:

Informal transfer is not allowed, and the only true official record of a transfer is the lodgement of the Deeds Office; it does happen quite commonly in townships and in lower income areas. It is not robust in law, it is not defensible in law, and it is not traceable, and it results in an exclusion of some properties from the formal deeds and from the formal property landscape. It absolutely happens, it is illegal, and it is a

problem.

(Interviewee#20, Zoom Interview, August 2021)

An inclusive and complete land registry could assist the government in dealing with the current inefficiencies, corruption, and fraud around the low-value property market segment emanating from informal transfers or trading. A land registry public good with secured and reliable property ownership records will support land reform title deed registrations and provide security of tenure, if it is accessible by most citizens. It will also assist the government to recover lost revenue by identifying property owners or free riders currently enjoying municipal services without paying. The government, through municipalities, could use its power and insist that each subsidised households must have a title deed and ensure that subsidised households also pay electricity, water, and municipality rates so that low-value property owners can be verified on an ongoing basis, which will keep the land registry updated and enhance the land registry integrity. This could also help deal with current inefficiencies and make the land reform security of tenure and title deeds registrations more sustainable.

6.3.2 Application and Beneficiaries Allocation Processes

Land reform is intended to benefit the poor in South Africa. However, there are currently multiple inefficiencies hamstringing the process. Moreover, there are also allegations of corruption and fraud involving traditional leaders, government officials and other key stakeholders in subsidised housing projects. Furthermore, another challenge is the fact that, in order to register middle- and low-value properties such as the government-subsidised and affordable houses during a resale, a conveyancer or attorney is required, and these costs add more financial burden to buyers and sellers in these market segments.

Due to lack of a consumer and beneficiary awareness and knowledge about the value of subsidised houses and a paper-based conveyancing process, allocating subsidised housing

beneficiaries has proven to be a tedious process. After the projects have been initiated, beneficiaries are requested to bring documents such as IDs and marriage certificates to go with the application form:

We are going to engage with you. We are going to ask you to come forward to sign sanctification forms. We will, from time-to-time, inform them that we are going to set up site office, you will come, and you are going to get a letter of invitation and please bring the following documents with, if you are married bring your wife and marriage certificates. So, each beneficiary will receive an invitation form and say come to the site office from Monday to Friday, bring the following documents to sign the application form.

(Interviewee #5, Zoom Interview, June 2021)

Some interviewees cited in the Urban LandMark Report (2011), around title deeds delays, argued that, while the residential property conveyancing system in South Africa is thorough and legally sound, it is far too complex for small transactions. According to the Urban LandMark Report (2011), one interviewee referred to the “overwhelming logistics” of arranging all the necessary people to be present at the state attorney’s office at the same time. Furthermore, he also found that beneficiaries could be extremely difficult to contact, and sometimes had to take a full day off work to attend (Urban LandMark Report, 2011). The developer sometimes had to arrange to meet beneficiaries on Saturdays or, in some cases, arrange for the state attorney’s representative to go to the beneficiary’s house (Urban LandMark Report, 2011).

Furthermore, another interviewee argued that:

South Africa has a first-world deeds system in a developing-world spatial context and there is a need to question the very necessity of title deeds.

(Urban LandMark Report, 2011)

The current inefficiencies, such as outstanding title deeds for the majority, counters the restoration of justice that land reform seeks to achieve and a technology such as blockchain could guarantee the security of the title deeds for the majority in a cost-effective manner. Other interviewees suggested that:

Most municipal contacts with the Deeds Office occur via a conveyancing attorney and questioned the necessity to have an attorney to undertake the conveyancing for subsidy properties, a process that, while mandated in law, brings considerable costs and complexity.

(Urban LandMark Report, 2011)

Moreover, one stakeholder (a development consultant) also asked:

Could we possibly, for example, remove the need for an attorney to undertake the conveyancing? We could examine overseas models for this and on reducing complexity of the process and reducing transaction costs.

(Urban LandMark Report, 2011)

It is evident that conveyancers currently have significant power over the current land registry's institutional arrangements and control both the deeds lodgement and the deeds transfers processes. There is a need for the state to intervene to liberalise the land registry so that there is less dependency on conveyancers, as this has led to the current dysfunctional resale market of subsidised houses due to conveyancing fees affordability. Blockchain could be considered as an alternative that could implement effective governance and enable the state to not entirely depend on conveyancers and attorneys by using features such as smart contracts to automate

the deeds lodgement and the deeds transfers processes. Huther and Shar (2005) argued that good governance is determined by the impact on the quality of life enjoyed by citizens, and this will empower citizens by reducing some of the costs.

The current paper documents can be tempered with, damaged, or lost during the application process which could lead to poor management of the subsidised and affordable housing land reform programme especially around title deed registrations.

Beneficiaries of the middle- and low-value properties such as government-subsidised houses and affordable houses cannot afford to pay the costs of the conveyancers or attorneys. This is contributing to the informal trading in these market segments which creates opportunities for corruption and fraud. Due to inefficiencies, a lot of corruption and fraud could happen during the land reform beneficiary allocation process before the actual title deed registration. The land registry is not only useful for the purpose of recording the ownership information of the allocated beneficiaries, but it is also useful in terms of verifying if such a beneficiary has been allocated or has received a subsidised house before to prevent fraud. Shang and Price (2019) also concluded that blockchain could curb forgery of land titles by creating an unmodifiable history of land transactions. A subsidised housing administrator interviewee indicated that the subsidised houses beneficiary allocation process involves a lot of screening to mitigate against opportunities for corruption and fraud and the process is referred to as the “term beneficiary administration”:

How it works is, developers will approach us, or municipalities will approach us and say we have a project planned, now let's investigate who are the potential beneficiaries for this project, then we will go and do full economics study and profiling of communities. Basically, with an eye on doing full pre-screen to see which are target communities for this housing project, who will qualify for government RDP subsidy, there are some criteria to be met for RDP house. We will do a full pre-screen

such as Home Affairs, Unemployment Insurance Fund, Pay-As-You-Earn, we will search full houses for subsidies. We will do Deeds Registry searches and then we will then come forward to our clients and say here is a database of pre-screened beneficiaries for your project. We will complete the housing certification forms physically with the beneficiary with the supporting documents, so complete certification forms and then you submit to your provincial housing boards for processing, then from there we will do it electronically and we link it with all the systems, we will draw status reports, what we call Housing Subsidy System status reports.

(Interviewee #5, Zoom Interview, June 2021)

It is also evident that subsidised housing administrators have significant power and control over the beneficiary pre-screening process and the process is not transparent to other actors. Lack of transparency around the process can result in subsidised housing administrators enabling principal-agent and collective action problems, which will lead to corruption and fraud. Moreover, it also appears that there is a duplication of effort when it comes to the collection of documentation for the “term beneficiaries administration” process, which is dependent on the HSS, and the conveyancing process that informs the deeds lodgement and deeds transfers processes with the Deeds Office. The process of completing housing certification forms is still manual and paper-based. Blockchain could digitise the beneficiary pre-screening process and the beneficiary allocation process, the application for housing certification, the collection of relevant documents and provide a single secured storage for all the documents needed for verification as part of the application process. All the documents could be available to the DHS, municipal housing departments and the Deeds Office from a central secured storage without duplication.

According to the Western Cape provincial government, the process goes through nine steps until completion. Interviewee #5 (2021) mentioned that DHS also reviews the whole subsidised

and affordable housing beneficiaries allocation process after the applications have been submitted by the administrators to provide robust checks and balances to detect and prevent fraud and corruption:

Basically, we will then submit applications forms prior to the process, they got a process were they redo the whole process to see whether the guys have title deed, they will do it again although we already done it previously. They will do searches on Unemployment Insurance Fund systems to see whether the guy is employed or not employed, because for a subsidised housing schemes it is more than R3 500 a month that is now the gross household subsidy, they check PERSAL system which is your government employee payroll. They check again all nine provincial housing subsidy systems to see if you don't have a subsidised house elsewhere in the province or in any other province, in other words they are clear to make sure in order to qualify you are not allowed to have had any housing assistance before.

(Interviewee #5, Zoom Interview, June 2021)

Due to lack of a system with a centralised repository for subsidised and affordable housing schemes, it also appears that there is a duplication of effort at national, provincial and local government levels, for example, the DHS and various municipal housing departments conduct the same verification processes in terms of processing beneficiary applications and allocations. This is because there is no single-view, secured and transparent system that can present all role players with the same beneficiary documents and ownership information. Interviewee #5(2021) further indicated that the beneficiary allocation process ends with a “Happy Letter,” which is handed to the beneficiary when the title deed registration and the beneficiary ownership information were successfully recorded in the land registry.

Once the house is completed, that beneficiary now needs to be traced, and say okay your house is ready, we need to hand over that house to you. So, that is a process on

its own which is being managed by the municipalities or the councils, Joburg city etc. They will then do a handover to the beneficiaries, and they will sign all the relevant documents, the transfer documents for title deeds, the bid of sale, the building agreement, and a very important document for that property, we call that a happy letter. That is the key handover document and also inspection document where the beneficiary says 'I am happy there are no defects, etc.'

(Interviewee #5, Zoom Interview, June 2021)

Currently the government has the HSS with each province managing its own system. The current separation of the land registry and the HSS results in multiple captures and storage of the same documents with various institutions, and this can create opportunities for corruption and fraud. The two systems need to reconcile daily if it is to be shielded from any kind of manipulation that enables corruption and fraud. Blockchain could be integrated with the land registry and automate subsidy and affordable housing application and allocation processes. Through decentralisation, the Deeds Office, the national DHS and all the municipal housing departments in each province could work on the same copy of the land registry database which will result in more transparency and accountability.

The affordable housing beneficiary allocation process differs from the subsidised housing allocation process in that it also involves banks because of the required loan portion in addition to the subsidy that the government provides to qualifying beneficiaries. The affordable housing beneficiary allocation process can also be mired by acts of corruption and fraud outside the land registry during the identification of the beneficiaries, which is normally handled by community leaders, traditional leaders, councillors, and municipality officials. Interviewee #5 (2021) also indicated that there is both a subsidy and bond component in the process for affordable housing:

First, the person makes an application for the first subsidy and if it is successful that subsidy becomes like a deposit as part of the land price or the construction price. We

set up appointments with all those that have a subsidy and bonded housing for them to sign the transfer documents and the bond documents because they need to sign a loan agreement with the bank, the bank collects those documents. So, there are two sets of documents that get signed for the conveyancing part and for the banks part.

(Interviewee #5, Zoom Interview, June 2021)

It appears that the affordable housing beneficiary allocation process is completed through until the Deeds Office issues a title deed, compared to purely subsidised houses where there is currently a backlog. This is because the bank must receive the title deed for the house since they have provided the owner with a loan. This suggests that the bank's involvement through PPIs as a private sector player in the property transactions offers more checks and balances to detect and prevent corruption and fraud.

It is also one way to prove that by having more participants involved in the deeds transfers, the land registry stands to provide more transparency, which will make stakeholders involved to be more accountable. Affordable housing proves that PPIs can also bring efficiencies. Moreover, if private sector stakeholders such as conveyancers and developers can also be empowered to work on subsidised housing with less dependency on municipalities and DHS there will be fewer inefficiencies which will also reduce the opportunities for corruption and fraud.

6.4 Land Registry Impact on Land Reform

The CAHF interviewee (#13, 2021) highlighted the significance of the government-subsidised housing market as one of the key components of the land reform programme and indicated that a third of the residential property market in South Africa is government-subsidised:

If we just look at the properties that has been registered, that's a third of our national residential property market, third, you know two million out of six million, that's a

third of the national residential property market subsidised by the government.
(Interviewee #13, Zoom Interview, August 2021)

The fact that the subsidised houses are the largest percentage of registered properties in the land registry, despite the outstanding title deeds problem, is an indication of how many citizens depend on and benefit from government land reform. However, this significant market segment is mired in inefficiencies and maladministration and, as a result, there are also acts of corruption and fraud. The government has been running the RDP housing programme since 1994 and has not caught up on the backlog at all:

What we were concerned with was that South African national government has a house subsidy programme that has been underway since 1994 and it's been part of the ANC elections manifesto, and commitments within the RDP was a commitment to better life for all, and through that the government have delivered somewhere about +/- 4,5 million subsidised properties across the country. When we look at that, that delivery has been accounted for in the estimates of national expenditure when the national departments report to the treasury how they have spent the money. But when we look at the deeds registry we cannot find 4,5 million properties, when you look at the deeds registry you can't identify exclusively a subsidy property, although you have acquired a property, to identify which ones they are, so we have searched the whole deeds registry.

(Interviewee #13, Zoom Interview, August 2021)

Interviewee #12 (2022) also argued that there are currently no systems and records to manage the RDP housing programme:

There are no systems, there is no data, you can read up on the parliamentary monitoring group, what the problems are with the backlog, one of the things they talk

about is dummy earth numbers, houses are bought before the general plans.

(Interviewee #12, Zoom Interview, March 2022)

The current maladministration and title deeds backlogs also forces beneficiaries to trade informally without proper records of property ownership. Interviewee #13 (2021) further argued that currently there is informal trading or informal transfer within the government subsidised housing market, which could lead to tensions and conflicts around who the owner of the property is among buyers and sellers in the secondary market, and suggested that there is need for a system to deal with the current maladministration:

I am quite worried about the casual nature of the property transaction at the very bottom because of the presumption that they are not valuable, but they are profoundly valuable, and they are increasingly so now and that could lead to tensions and conflicts as well. How do we manage that? We need a system that is future-proof.

(Interviewee #13, Zoom Interview, August 2021)

The third driver of corruption is the structural weakness of property rights in countries where most assets are still unproductive and cannot pay for their protection (Khan, 2004). This is also true for government-subsidised houses which are still mostly unproductive because of the lack of the secondary or formal resale market and the current low-value associated with these properties. However, the Advisory Panel on Land Reform and Agriculture (2019) warned against private titling of communal land. Rather, the panel recommends a Land Records Bill to enable the majority of citizens who hold property off-register to record and register their property including residents of informal settlements, farm dwellers, labour tenants, residents of communal areas, and others. The decentralised blockchain land registry will expand the current land registry and increase access to all the citizens currently with no access and provide them with tamper-proof title deeds. With these, there will be fewer fraudulent transactions. Law

enforcement agencies will also be able to rely on the tamper proof title deeds records during the investigations.

6.5 Corruption and Fraud within the Land and Real Estate Sector

Enforcers such as politicians, police, judges, the media, and civil society organisations may not have the power to enforce in many areas or may themselves be directly or indirectly benefiting from corrupt activities (Roy, Khan, and Slota, 2022). All interviewees have admitted that corruption and fraud exist within the land and real estate sector, but it is not severe in South Africa. However, this is in contrast with the Transparency International's 2022 Corruption Perception Index (CPI) on South Africa. Despite South Africa scoring 43 on the CPI, which is above the sub-Saharan regional CPI average of 32, public sector corruption remains a serious problem in the continent's southernmost country (Transparency International, 2022). Moreover, Afrobarometer (2021) also concluded that most citizens are dissatisfied with the way the government is handling the fight against corruption, suggesting that the National Anti-Corruption Strategy and other efforts to strengthen independent oversight have not yet had their desired impact.

Some interviewees indicated that they have heard and read about it in the media, but they have not been directly involved in such situations. While the Deeds Office and the land registry are confronted with some governance inefficiencies, in contrast, most of the interviewees indicated that the land registry itself is far the most efficient and effective system. Interviewee #12 (2022) argued that the problem is not the land registry but processes around the land registry that can potentially enable corruption and fraud:

The Deeds Office is the last thing in the chain, you have to do lot of work before you get anywhere near the Deeds Office, so part of the problem is way before you get to the Deeds Office. I mean if there is a dispute in terms of who owns the house, the

Deeds Office is not going to help you, if someone is dead and you need to transfer the property from the deceased estate, you have to deal with the master office, what is happening at the Deeds Office, it is a final stage and, by then, if you get to the front of the Deeds Office, you are okay, fantastic, you have made it. You can't get anywhere near there, because the generation of missing links in the chain and you have to go and figure out who owns the house and there is no information of who owns the house. (Interviewee #12, Zoom Interview, March 2022)

There is currently no system with complete ownership information for subsidised houses and blockchain could assist with some of the challenges and missing links by integrating the land registry with other key stakeholders' systems. Interviewee #2 (2021) argued that:

Once a transaction is completed, they will be captured digitally, can they be tampered with? I am sure anything is possible, but I would like to think that, that part of the transaction and the Deeds Office are very, very strict, the examiner, everything needs to be in place for him to pass that transfer through. (Interviewee #13, Zoom Interview, August 2021)

Moreover, Interviewee #13 also lauded the current system and suggested that:

We got a beautiful deeds registry in South Africa, some people say it was never captured, it's a system that has integrity, well-structured with good conveyancing system. (Interviewee #13, Zoom Interview, August 2021)

According to Roy, Khan, and Slota (2022), three key interdependent factors are required for an anti-corruption strategy to be effective: accurate information about rule violations, which

transparency measures try to ensure, and clear procedures for using this information to sanction violators, which is what accountability processes provide. Moreover, when violations are widespread, we also must explicitly look for actors with the power, capabilities and interests to use information and procedures to reduce corruption (Roy, Khan, and Slota, 2022). There are several stakeholders or actors involved in the government land reform programme acting as either principals or agents. Some interviewees indicated that they have dealt with some of the corruption and fraud cases as part of their day-to-day roles and responsibilities. Furthermore, evidence suggests that corruption and fraud occur within the real estate sector, not only within the Deeds Office and around the land registry, but across all land administration and management processes wherein government officials also collude with other professionals such as estate agents and conveyancers. One of the interviewees from the Deeds Office alluded to the fact that there have been some collective action problems as well whereby corruption and fraud happens through a crime syndicate which involves collusion by several stakeholders within the real estate sector:

I work very closely with SIU, the National Prosecuting Authority, the Hawks even, with all the commissions, etc. All of that is very confidential of course on my level, but from my legal support unit, we also engage directly with other departments because unfortunately fraud is still almost out of control because of huge, huge syndicates involved throughout the whole value chain from the time when property is sold or bought. In the Deeds Offices, there are officials who are part of the syndicate, and you will find in the banks that there are officials who are part of the syndicates, same as you will have it in SARS or in the state Master High Court Offices, wherever, they are all over.

(Interviewee #6, Zoom Interview, September 2021).

Another interviewee that works as a conveyancer suggested that corruption could potentially happen at the Deeds Office and by the municipal council:

Perhaps at the Deeds Office, it's all possible. Obviously outstanding rates, it's all possible, I would say if it was going to happen it would be at the Deeds Office or council as well as securing plans, property or building plan, getting plans approved for example that may not be quite legal.

(Interviewee #3, Zoom Interview, June 2021).

Interviewee #1 (2021) went on to describe the people who are normally involved in corruption and fraud by suggesting that:

It's councillors that make decisions and the laws right! They will have an advantage over communities in terms of land rights, traditional leaders as well, they are also involved in those processes and make decisions and laws to say this business can do this kind of business in this community and they create laws to put that company in a favourable position.

(Interviewee #1, Zoom Interview, March 2021).

Traditional leaders will continue to exploit the property owners within the communal land due to lack of secure tenure and recorded title deeds, as described above by Interviewee #1 (2021). A view from a conveyancer suggested that estate agents can also collude with the conveyancers due to the business relationship that gets formed during the buying and selling process:

In terms of the law, the right is afforded to the seller to appoint the attorney and the conveyancer who is going to process the transaction, that right is afforded to the seller, but many times you know they don't know conveyancers and they are therefore relying on the estate agent to whom they pay a commission, to hold their hand, guide them through the process and make a recommendation. Obviously, we know that the estate agent will prefer the attorneys they know, and they trust, and they get a good service from and as a result a business relationship is formed between the attorneys

and estate agents. I suspect it could happen, we live in a society where we are not immune to bribery and corruption.

(Interviewee #3, Zoom Interview, June 2021).

The current dependency on estate agents and conveyancers by buyers and sellers makes them more vulnerable to corruption and fraud because of the abuse of power and trust placed in them. Interviewee #13 (2021) also suggested that all of the above is possible:

I will presume that, I haven't seen that proven at all, conveyancers are human, they can be corrupt, we have seen that, there are definitely conveyancers who play around the outside of the system.

(Interviewee #13, Zoom Interview, August 2021).

Interviewee #20 (2021) suggested that some of the estate agent's behaviour and actions are questionable and can amount to fraud and corruption:

We talked about fraud in a sense that it is not legal when it comes to transferring title deeds informally outside the Deeds Registry and that's completely rife. When it comes to corruption, I am not sure, there are probably a number of things that happen within the real estate sector which can be considered borderline depending on what you consider as corruption. I think that is the integrity with which real estate agents are expected to behave and is not always there, and before the Property Practitioners Act, which is now rigorously being implemented, I think there is definitely room for corruption.

(Interviewee #20, Zoom Interview, August 2021).

Principal-agent corruption or fraud issues whereby the agent is expected to act in the best interest of the principal are likely to happen due to direct instructions to the subsidised housing administrators from time to time by officials such as councillors and members of the mayoral

committees (MMCs) to allocate certain beneficiaries. Interviewee #5 (2021) indicated that depending on the situation, other stakeholders also get involved:

What does happen is that we patiently get the Premier and the MMCs' desk instruction to allocate a certain beneficiary in another area temporarily while their RDP houses have been vandalised or flooded etc. So, we do get instructions but that comes officially from the MMC or the Premier's office.

(Interviewee #5, Zoom Interview, June 2021).

However, Interviewee #18 (2021) noted that that the City of Johannesburg (CoJ) municipality has a policy which prohibits city officials and councillors from performing the beneficiary allocations in normal circumstances in order to limit the abuse of the system or principal-agent and collective action problems because of political office bearers' interference in the land administration and management:

Councillors have been accused of corruption by communities over the years, so one of the things that was included in our policies was to say councillors should not be responsible for distribution and allocation of houses. Their role is only oversight, it also applies to officials. The role of officials is to allocate as per the subsidy, unless there is a waiver by the MMC responsible for housing or the MEC [Member of the Executive Committee] responsible for housing.

(Interviewee #18, Zoom Interview, September 2021).

Even though there is the government's National Housing Code policy, which provides mitigation controls to prevent public officials from enabling corruption and fraud, the current manual and paper-based system can enable agents such as public officials to engage in corruption or fraud. The process of allocating beneficiaries is currently done manually using Microsoft Excel spreadsheets. This means that the process can also be manipulated or tampered

with by various stakeholders involved in the administration processes that get to work with the spreadsheets. Contrast this with blockchain's unmodifiable history of land transactions, as described by Shang and Price (2019).

6.5.1 Forms of Corruption and Fraud and the Root Causes

Evidence suggests that most of the corruption and fraud occur outside the land administration and management processes and systems. For example, when there is a death in a family or when the owner passes away, and when there is infighting among the family members in terms of who will become the next property owner. Moreover, an interviewee PPRA indicated that the root cause is because of consumers' lack of knowledge and suggested that, within the townships property market, there are some principal-agent problems between estate agents and the current occupiers of the property. Interviewee #11(2021) suggested that there are also some collective action problems whereby some property owners or buyers get defrauded of their houses by the current occupiers of the house with assistance from the community, who then demand that the new owners vacate their properties even after purchasing the properties through the banks:

I have come across one estate agent who sells the same house over and over again, and in that house, we have people that have defaulted on that house. The bank has attached the property and this estate agent is now taking advantage of the fact that the people who are staying in the house have not been paying the bond. They know they have defaulted, nor the bank has served them with eviction orders but because they live in a community, Protea Glen is one of the examples, in a community where the community itself, they gang up against the sheriff when they come and evict people, you find that the estate agent now colluded with the occupiers of the house.

(Interviewee #11, Zoom Interview, July 2021).

Interviewee #11 (2021) further suggested that there are buyers who continue to pay back the loan from the bank even though they are not staying in their house:

We got people who have been paying for houses for almost five years, they don't stay in that house, but the banks do get their money. It is consumer awareness more than anything else on the part of the purchaser.

(Interviewee #11, Zoom Interview, July 2021).

In the defence of the banks, Interviewee #10 (2021) responded to the issue by saying that:

That used to be quite prevalent some years ago, probably 10 to 15 years ago. First of all, let me say the banks are not implicated, there was a Human Rights Commission hearings back in 2005 ... what came from that, is that what banks will do is to sell the batch of properties where they were unable to get vacant position and beneficial use on those properties because of community interference, sell that portfolio to a third party and you will then try get vacant position and beneficial use and put people in. So, there was a lot of discussion at that time where there were a lot of allegations which proved to be fruitless.

(Interviewee #10, Zoom Interview, December 2021).

Furthermore, Interviewee #10 (2021) indicated that the banks now have controls in place and must comply with the law:

First of all, banks have to comply with the National Credit Act 34 of 2005. Number one, the prescripts enforce what fees and interests you charge, then we have a defined process that we have to follow if we were to repossess a property. Before I can actually get an eviction, I have to actually take it to court and demonstrate to courts that I have followed the due legal process, number two, and also the considerations of what happens to that family, if they are evicted they are not just going to be evicted to

the gutter. Then, of course, when it comes to property auctions, there is a process that one needs to follow to assess what is the value of that property, what is the reserve price that you are going to set, so it is a very controlled process. I think 15 to 20 years ago it used to be more prevalent, but since then, a lot of regulations have been put in, and controls put in to ensure that sort of thing does not happen.

(Interviewee #10, Zoom Interview, December 2021).

Evidence also indicates that corruption and fraud also happen when money exchanges hands between buyers and sellers through the estate agents' trust accounts:

If you are a consumer and you are alleging that an estate agent misappropriated your trust fund, you must furnish us with the bank deposit slip or proof of payment, and then inform us as soon as it is reflected, if it was R750k, it went into this trust account. Remember we have the details of their trust account, the estate agent, because they register it with us and we audit it, we go back and check, and we are also able to ascertain the audit report that yes, the money came through, but it went out.

(Interviewee #11, Zoom Interview, July 2021).

Interviewee #11 (2022) also highlighted some of the corruption involving estate agents:

For example, an estate agent playing with buyers and each other, in order to get a higher price which possibly benefits them in terms of the commission.

(Interviewee #11, Zoom Interview, November 2022).

Interviewee #17 (2022), from the LPC, also suggested that fraud happens around the fidelity fund:

We got the straightforward theft, where the attorney requests the client, the purchaser deposits the purchaser price, something happens and the money is gone, the attorney

or staff member stole the funds, so that is a straightforward theft that will lead to a claim against the practitioner's fidelity fund and subsequently you will have to proceed civil action and proceed with criminal action against the attorney.

(Interviewee #17, Zoom Interview, May 2022).

Moreover, Interviewee #13 (2021) indicated that conveyancers also engage in corruption and fraud activities by bypassing the controls and processes and taking advantage of the inefficiencies such as paper-based registration processes and current delays in the registration processes:

In South Africa, what also happens, I have seen, is that a property owner may sell their property with the conveyancer, let's say on Monday, and the conveyancer submits the documents on Monday to the Deeds Registry. On Tuesday that property is sold with different conveyancer, in different part of the town, and they receive the money from both transactions and by the time everybody knows it is too late, the money is gone, that has been happening, we have seen that happen as well. That's supposed to be avoided by the trust account right, because you are not supposed to give money to the seller directly, you put it into a trust account until a transfer actually goes through, the problem is that people do not trust the trust accounts and people want cash transactions.

(Interviewee #13, Zoom Interview, August 2021).

Volintiru and Osuna (2018) argued that corruption decreases the quality of public goods and services provided and this seems to be the case when it comes to the government-subsidised housing market. Interviewee #13 (2021) also suggested that corruption and fraud issues in the government-subsidised housing market, which is one of the government's key land reform programmes, appears to be perpetuated by the lack of formal security tenure in a form of a title

deed and, as a result, when beneficiaries sell their properties, the buyers become victims of corruption and fraud:

What we have seen is that, there are properties that were sold 10 years ago for a certain amount and the sellers comes back today and says you know that wasn't a fair transaction, it was too low, I think you need to pay me another R100k, or another informal transaction when somebody passes away and the child comes back and says this title deed is in the name of my deceased father, I am coming to claim my property. (Interviewee #13, Zoom Interview, August 2021).

Furthermore, Interviewee #13 (2021) indicated that corruption and fraud is fuelled within the government subsidised property market due to issues of ownership registration or lack of title deeds for some of the houses, and the government is failing to prevent beneficiaries of subsidised houses or properties from selling their properties within the first eight years of occupation:

There are a lot of properties that have been transferred to people. They trade without one of them registering, without formally registering or transferring those transactions, partly that's because of the Housing Act, it has Section 10 (a) and (b) as the preamble clause which says you are not allowed to sell your property in the first eight years. (Interviewee #13, Zoom Interview, August 2021).

Interviewee #13 (2021) further highlighted that some of the issues of corruption and fraud within the government-subsidised housing market are enabled through affidavits from the police and in situations where there is no will and testament:

Sometimes they do it under the radar; you know they just go to the police station and staple the affidavit and to say we have made this transaction, or it could be in some cases, is not an active transaction, the title holder has died, and the new person has not

received a new transfer on that title deed because there wasn't a will, so case is still ceased with the state and so on.

(Interviewee #13, Zoom Interview, August 2021).

The affidavits that beneficiaries of the subsidised houses are using to buy and sell subsidised houses informally are not recorded anywhere in the system and this means that the government has lost track in terms of managing the subsidised housing programme, which is contributing to the poor management and poor implementation of land reform. Furthermore, Interviewee #11 (2021) indicated that some estate agencies have also managed to sell properties without the knowledge of the buyer or properties that are not on the market:

Let's say the agent sold Block A number 6, and that Block A number 6 was not for sale, then you hear the person saying that property is not for sale, maybe the owner come out to say, I have never mandated someone to come and sell my property or you come with a deeds search saying that the property is being sold by Mr Maxwell, in terms of the deeds that property doesn't belong to Mr Maxwell, it belongs to Mr Jones, we then say to the agent, agent, this was fraud.

(Interviewee #11, Zoom Interview, July 2021).

The above scenario implicates not only the estate agent but also suggests that there could have been a collective action problem whereby the estate agent colluded with one of the Deeds Office officials to tamper with the property ownership records.

Interviewee #11(2021) also indicated that during divorce settlements some elements of fraud can also happen:

I know of situations where, like in divorce settlements where we had partners coming to report an estate agent who sold a property without the other party signing, we also concentrate on disciplining the estate agent, but we cannot reverse the transaction, the

other party needs to make an application to court for the property transaction to be reversed on the basis that the estate agent have committed fraud.

(Interviewee #11, Zoom Interview, July 2021).

To ensure equity in terms of the distribution of the land, the government makes it compulsory for those who are married to be joint owners of their subsidised house. Without a system with reliable records, it will be difficult for the government to ensure that those who are vulnerable, particularly women, are not evicted from their houses when the marriage is over. The Deeds Office also experiences some fraud elements from time-to-time whereby various fraudulent documents are submitted to the Deeds Offices:

We do find at times fraudulent transfer duty receipts, fraudulent rights clearance certificates, fraudulent court orders, fraudulent letters of executors, appointment of representatives in a state of deceased persons and so I can continue.

(Interviewee #6, Zoom Interview, September 2021).

Another Deeds Office interviewee also echoed the same sentiments and highlighted that corruption and fraud can happen at any stage within the Deeds Office and within the value chain outside the Deeds Office:

I think the deeds process flow is where corruption will take place because it is where money mostly is, right from the entry of deeds in the Deeds Office, there is a threat and a possibility of tinting the processes with fraud and with corruption until the process of registering the title deed. So, in the whole value chain within the Deeds Office and in the value chain outside the office, documents could be fraudulently received, documents could be tempered with, when they are coming to the office, they are coming to the office already tainted, the processes inside the Deeds Office, certain

individuals can collude with conveyancers and lawyers to register transactions. (Interviewee #7, Zoom Interview, August 2021).

Furthermore, Interviewee #7 (2021) also mentioned that some of the Deeds Office officials internally also collude with other key stakeholders such as conveyancers:

The other aspect, that we normally come across, is when there is collusion between our staff members and the conveyancers, or you can put it as lawyers, where prescribed documents are not lodged with transactions. When you sell, there must be a certificate from SARS, saying taxes were paid, there must be a certificate from the local municipality saying rates were paid, in some transactions these two documents are lodged after the transfer, in other words they are not lodged when the transactions are being registered, but someone will bring them after the registration. (Interviewee #7, Zoom Interview, August 2021).

Interviewee#7 (2021) also cited forgery of signatures and documents as some of the other corruption and fraud elements that are also prevalent within the Deeds Office:

You get people who pretend to be the owners, who forge the signatures of the correct owners, who pretend to have the authority to act on behalf of the owners, people who pretend that they got authority to act on behalf of the municipality, on behalf of the government and they are not empowered to act, and there is also institutions where people will lodge fraudulent documents. For instance, certificate from the Master of the High Court in most instances or some instances it could be forged, you will assume it is a legitimate document, only to learn later that it was forged, the copy of the ID sometimes it will be forged, a title deed, in other words the registered title deed, it will be tampered with, a necessary information will be removed and a fraudulent

information will be inserted inside.

(Interviewee #7, Zoom Interview, August 2021).

Interviewee #7 (2021) also indicated that, in some instances, Deeds Office officials fail to perform their duties, practice favouritism, and enable corruption and fraud:

The other corruption, that we normally see, it's when you are supposed to legitimately reject a transaction that is not complying with the necessary prescripts, the people will call the conveyancers and saying I am with your transaction and I have identified 1, 2, 3 as errors in the transactions, please come and correct so that we can proceed with a transaction. Others will be, where certain transactions are put forward at the expense of others, in other words, you have lodged your transaction on Monday, but because you got people inside that you are working with, now they put forward your transaction, in other words they fast track your transaction to the detriment of other transactions that were lodged prior to yours.

(Interviewee #7, Zoom Interview, August 2021).

It is evident that most of the fraud is enabled through the documents that are required during the transfer process. A secured, decentralised blockchain land registry integrated with systems for key institutions such as the DHA, SARS, municipalities, DEL and DoJ&CD could automatically check IDs and marriages certificates, tax statuses and if taxes have been paid, if municipal rates and taxes have paid, UIF and PERSAL numbers and court documents like divorce decrees. With the necessary integration in place, fraudulent activities such as late submission of documents, document forgeries and signature forgeries could be eliminated using blockchain. The verification of who uploads what, when and where could also be established with a tamper-proof blockchain audit trail.

Some of the corruption and fraudulent activities happen outside the Deeds Office and the land registry processes. For example, around the valuation of properties, the valuation of a specific property could be listed too high or out of the market range because someone is going to get a kickback or bribe of some sort, which can result in a principal-agent problem between a buyer or seller and an estate agent for the benefit of an estate agent who then colludes with the valuator resulting in a collective action problem. Interviewee #2 (2021) concluded by saying that:

I have not been party to that kind of transaction, but I have been aware of one or two transactions in my career... but then again, that's where the banks need to play a big part because they also have to be accountable, because they are loaning that person that amount of money, so they do their own property valuation, obviously they are protecting themselves, to ensure that the buyer is not overpaying for that property and that it is in line with what the market is or where the market is at.

(Interviewee #2, Zoom Interview, March 2021).

Interviewee #1 (2021), from Corruption Watch, highlighted some of the forms of corruption and fraud around the land reform programme that emanates from principal-agent problems involving councillors and argued that:

The onboarding of houses to applicants is problematic because houses are fraudulently registered to other people, even though the applicants have been on the waiting list for decades in some instances, you find that councillors will give houses to friends and families and rent them out even though they are not allowed to do that because it is a government-sponsored house, they will rent out to make profit out of them.

(Interviewee #1, Zoom Interview, March 2021)

Interviewee #12 (2022) suggested that corruption and fraud is rampant within townships and rural areas but not in more affluent areas:

It is absolutely rampant, it is not necessarily something you can find in the suburbs, but in the townships and rural areas wherein titles have been compromised and no titles have been issued, or people have transacted, or registered owners have passed away, title has not been maintained.

(Interviewee #12, Zoom Interview, March 2022)

Interviewee #12 (2022) further mentioned that the severity of the problems within townships prompted Delft police station in Cape Town to create a dedicated unit to investigate subsidised housing-related fraud:

The Delft police station has opened a special unit specifically to look at housing-related fraud because there is no accurate records of who owns the property, because so many registered property owners are deceased and there is enormous opportunity for corruption and fraud and people are realising this and there are so many cases of people houses being sold without them knowing and it's a huge problem.

(Interviewee #12, Zoom Interview, March 2022)

Furthermore, Interviewee #1 (2021) suggested that public officials sometimes take decisions in favour of private companies such as mining companies who are willing to pay bribes without consulting communities:

You will find that they will create laws and policies that will put communities at a great disadvantage, those pertaining to rezoning. For example, it will be said that we are going to rezone this community and, all of a sudden, a structure will be erected in the middle of the community, bridge, road or a mine all of a sudden will be erected because of the so-called rezoning which has severe consequences for that community.

(Interviewee #1, Zoom Interview, March 2021).

Interviewee #10 (2022) also highlighted that some of the fraud happens around the properties within communal land where women are likely to be victims when dealing with traditional leaders and public officials:

What you really want to avoid is the lesser form of tenure that doesn't protect the vulnerable in our country and the way you do that, in my view, you give them increased security of tenure, a title to their properties. I remember a couple years ago being in a conference and a whole lot of people highlighting the insecurity and unfairness of them being allocated and using the property. There is one instance, where you had a family that have lived together for over 20 years and they were two or three siblings, then the husband who was allocated the property by the Chief died, and what did he do? He allocated the property to the deceased brother and the wife and the three siblings had to leave that property. I think the solution has to be the improved security of tenure where there is a title where that family is actually protected.

(Interviewee #10, Zoom Interview, December 2021).

Interviewee #20 (2022) highlighted issues such as unpaid municipal bills as one of the root causes for people to engage in illegal informal transfers:

Transfer fees being incurred, people want to avoid that, so they illegally transfer property. Some properties, particularly in the townships, have a history of decades with unpaid municipalities bills, and you can't transfer a property unless those are nullified so it is difficult to do that without paying fees, nobody wants to pay the fees, neither the seller or buyer.

(Interviewee #20, Zoom Interview, November 2022).

It is evident that the verification of whether the seller is paying municipal rates and taxes is one of the reasons perpetuating illegal transfers within the townships as many want to avoid paying these costs.

6.5.2 Corruption and Fraud Current Mitigation Controls and Efforts

Interviewee #7 (2021) suggested that the Deeds Office, through its deed transfers examination processes, is able to provide the necessary oversight, due diligence and fraud prevention controls to deal with some of the fraud elements:

Before we register, three people must go through each document, you got your first examiner, who is going to do elementary examination, you got your second level examiner, now this second level examiner is someone with legal qualification, you cannot examine deeds if you don't have a legal qualification, then you got your third level examiner is called a monitor, who is going to check if correct standards were made. Detection could be, firstly by someone making us aware of these transactions, that is number one, number two, where it is blatant, where we are examining we could see from your document in front of you that Tom here is the owner, but it is Jack transferring and documents were signed, then you can see blatantly from the document.

(Interviewee #7, Zoom Interview, August 2021).

Some organisations are playing a watchdog role within the real estate sector to protect consumers and guard against corruption and fraud, and they could potentially play a role in a more decentralised environment as some of the participants:

In terms of our legislation, one of our co-mandates is to also protect the consumer, that is to investigate complaints from the consumers.

(Interviewee #11, Zoom Interview, July 2021).

Interviewee #11 (2021) is referring to the PPRA and indicated that all corruption- and fraud-related matters involving estate agents get to be investigated by the body:

It is an online complaint form, and we also got a manual complaint form that is submitted by a consumer who is aggrieved by the conduct of an estate agent, and within the regulatory body, we got a department called the disciplinary department which is responsible for investigating these matters and also prosecuting those matters.

(Interviewee #11, Zoom Interview, July 2021).

The PPRA also highlighted another mitigation control that involves auditing of the trust accounts of the estate agencies, which is where they keep buyers and sellers' deposits for transfer duties and SARS expenses:

Once the trust account is open, it is then in terms of the legislation to be audited annually to detect fraudulent transactions. So, each year we submit an audited report of your trust account... and your trust account must be audited by an auditor who is registered with IRBA [Independent Regulatory Body of Auditors]. As an estate agent, what we require from you when you register is that you are supposed to come with a letter from the auditor confirming that they have agreed to audit your books, your auditor is then registered on our system, we call it the agent portal which is online and then every end of your financial year, your auditor has to submit the audit reports, confirm the status of the audit as well as our audit department will then go through the audit report. If they find that there are any fraudulent transactions in your audit report, or your auditor reports a fraudulent transaction. Then we will also get to know of that fraudulent transaction in your trust account and we will then discipline you for fraud. So, it is two processes, either it is the consumer himself or it is a discovery that is made by your auditor and disclosed in the audit report, which is also reviewed by our

audit department.

(Interviewee #11, Zoom Interview, July 2021).

The majority of interviewees indicated that, in South Africa, the land registry has robust checks and balances that provide transparency and security to the owners and that normally assist to prevent corruption and fraud compared to other countries. This is also in line Transparency International's (2020) findings that South Africa is relatively transparent in property registrations and land deeds, with no legislated discrimination against the gender of land owners. However, according to National Treasury (2017), South Africa's ranking on ease of doing business has slid to 74 overall and 104 for registering property, which suggests that there are some inefficiencies and weaknesses that can be addressed by improving the land registry public good.

The first view was also confirmed by the Deeds Office by pointing out the system is robust and registers both the deeds and the title which is not the case in some other countries:

Some countries, they don't register deeds, they register titles, in other words, they don't examine, they assume that everything that you give them on that one-page form is correct. When you register a property that way, it means you must have insurance over your property, because if there is a dispute over the ownership of the property, the Deeds Office, overseas that allows for one-page registration, is no longer a party. Here in South Africa, you sue the Registrar, if the property was incorrectly registered, because our system is the registration of deeds, Deeds Office must have confirmed all the facts.

(Interviewee #7, Zoom Interview, August 2021).

Interviewee #3 (2021) also suggested that conveyancers follow a stringent process which helps to detect and prevent some of the fraud from happening but it is currently a manual process:

So, we go to the Deeds Office physically with those specific transactions, that batch, it's printed out, it's hard copy, it is not electronic, and we lodge it in the Deeds Office, every transaction needs a barcode, and the Deeds Office records the lodgement electronically by scanning the barcode, the transaction is examined by the examiners. You can go and track that transaction using the barcode, but once it is done, we call it a once-off registration, when it is ready to be registered, the conveyancer goes physically to the Deeds Office and signs that registration and hands it in to the Registrar, who also puts his/her signature to that Deed to confirm the registration. So, it all happens manually at the moment.

(Interviewee #3, Zoom Interview, June 2021).

Furthermore, one of the activities that causes delays during the purchasing of land or properties is the fact that buyers and sellers are required to sign documents physically with conveyancers who are Commissioner of Oaths, which serves as a confirmation to say that the buyer or seller is legal:

If a party is overseas, they are rules that apply in terms of our Deeds Registry Act for them to sign those documents overseas, they have to be properly notarised and if you are signing documents overseas that will be lodged in the Deeds Office, you will have to sign either what we call a notary public or concealment, verified through a government office or any South African concealment overseas, that's the only way right now that you can sign the documents outside South Africa that are being lodged in a South Africa's Deeds Office... the documents are signed in order for us as the conveyancers to be satisfied that a proper verification was done of the person that sign the documents overseas, but if they are signing in South Africa, they sign in our presence and if, for whatever reason, they are unable to come to our offices to sign in our presence, we are prepared to go out and see them and I am satisfied to prepare the documents for lodgement because the identity of the seller has been verified, they

signed affidavits confirming their names, IDs, their marital status, their solvency that got to sign under oath in front of the Commissioner of Oaths.

(Interviewee #3, Zoom Interview, June 2021).

Moreover, conveyancers are governed by the South African Legal Council's Code of Conduct, which plays a major role in terms of making sure that all the necessary verifications and checks are conducted before transactions can be given a green light:

One of those laws is FICA, we need to FICA our sellers and buyers. The other thing is that they need to sign affidavits; they need to sign in our presence because we are Commissioners of Oaths. So, in terms of FICA we need to verify who the owner of the property is and where they are, and we do that. There are very strict rules that apply to us, the FICA rules, and we can be audited anytime, and we can be heavily penalised if we do not comply with the FICA legislature.

(Interviewee #3, Zoom Interview, June 2021).

Watchdog organisations such as the PPRA also hold their members accountable which helps prevent or reduce fraud and corruption:

We take disciplinary action against the estate agent, also we are able to involve South African Police Services and that the estate agent is arrested for fraud.

(Interviewee #11, Zoom Interview, July 2021).

Furthermore, the identification of buyers and sellers engaged in the transaction is an important step in a process to ensure the legality of the persons:

Sometimes our sellers or buyers are not within the borders of South Africa, anyone can purchase property in South Africa as long as they are legal, but if you are a South African but you cannot prove who you are and where you are, then you cannot own a

property in South Africa.

(Interviewee #3, Zoom Interview, June 2021).

In addition, transfers are triggered by a reason defined as part of the buying and selling process which helps to locate the potential corruption or fraud elements:

If a transfer were to happen, for a transfer to come into effect in South Africa, transfer of ownership, there needs to be a reason for that transfer of ownership and examples of reasons are a sale verified by a sale agreement entered into in writing by the parties and inheritance that is another reason. A donation is a reason, a divorce settlement agreement in terms of the divorce is also a trigger. Let's say, for example, that someone want to take advantage of a beneficiary in terms of a will or a minor in terms of guardianship or whatever, because a trigger is there as inheritance, as attorneys we have to follow, once again, estate law and the rules applicable to that. Is there a will? If there is a will, we want to see that will. Has that will properly concluded? Is it properly signed? Was it properly witnessed? Was it properly drafted?

(Interviewee #3, Zoom Interview, June 2021).

An estate agent also expressed trust and her confidence in the DRS and argued that:

Say, for example, we have taken an offer and we are unaware that someone is married in a community of property, very, very quickly, attorneys will pick it up, very quickly and we need to go back and get the spouse to sign. It will be very, very difficult to go very far, in a fraudulent transaction.

(Interviewee #2, Zoom Interview, March 2021).

The conveyancer also argued that there are mechanisms in place to protect women from fraudulent activities. For example, during divorce processes, the Deeds Office checks the marriage types and settlement agreements:

When it comes to a divorce, let's say, for example, the parties own the property together, and now they are getting divorced and in terms of the settlement agreement the house goes to the wife and the 50% share goes to the wife, that settlement agreement and the divorce order gets lodged to the Deeds Office and the Deeds Office does the verification.

(Interviewee #3, Zoom Interview, June 2021).

Trust accounts are also an important control and monitoring mechanism to prevent corruption and fraud involving estate agents:

It does happen that once the purchaser has paid money into the trust account, then the estate agent doesn't submit/appraise it or for other reasons, which we never know why, the money is no longer in the trust accounts.

(Interviewee #13, Zoom Interview, August 2021).

Banks seem to be playing a major role during the processing of bonded transactions to ensure that the transactions are credible, and their controls prevent some of the corruption and fraud elements around valuations. Interviewee #2 (2021) went on further to say that:

Funny enough, I sold a property where the bank came and said, sorry we don't find value in that price. So, if there is a bond to be taken out on that transaction, it will not happen because the bank will step in and say, I am very sorry.

(Interviewee #2, Zoom Interview, March 2021)

Despite the Deeds Office being central to the deeds and title registration processes, there are other key government institutions that also provide necessary checks and balances to help detect and prevent fraudulent transactions from going through and to help stem corruption. Key stakeholders within the real estate also follow due process within their respective mandates to

try and detect or prevent corruption and fraud. These organisations include the SARS, banks and government municipalities:

You still need SARS to issue that tax clearance exemption, so we engage with SARS as a government office, then we need to lodge a rates clearance certificate in the transaction, confirming that all the rates and tax service payable to the local municipality are up to date, we therefore engage with City of Johannesburg, City of Tshwane, City of Cape Town, depending on where the jurisdiction of the property is. (Interviewee #3, Zoom Interview, June 2021)

It is evident that the verification of whether the taxes have been paid with SARS is one of the key steps in verifying the legitimacy of both the buyer and a seller. It also appears that there are currently checks and balances already in place within the real estate sector. However, the current controls are still manual and paper-based and can still enable corruption and fraud. For example, estate agents and conveyances rely on FICA verification to detect, identify, and prevent some of the fraud and corruption elements. The collection of documents such as tax clearance exemption and municipal rates tax clearance certificates by estate agents also contributes towards the legitimacy of the buyer or seller which also assists in preventing corruption and fraud.

6.6 Deeds Office and Land Registry Governance (Land Governance Inefficiencies)

Some of the current issues, challenges and limitations contributing to the poor implementation of land reform and which enable corruption and fraud are because of a lack of adequate or enhanced transparency, accessibility, auditability, security, reliability, and accountability around the land registry. This is in contrast to the visions proposed by Rothstein and Teorell (2008) and the United Nations (2009), which outlined good governance as the political systems

that promotes participatory, lawful, transparent, responsive, consensus-oriented, equitable, inclusive, effective, efficient, and accountable processes.

6.6.1 Lack of Security of Tenure

The decentralised land registry public good can help the government provide secure tenure and issue title deeds that can be hosted on a tamper-proof blockchain for property owners that mainly reside within communal land owned and managed by traditional leaders and community trusts. The lack of title deeds for properties on communal land suggest that there could be a lot of hidden corruption and fraud that cannot be formally investigated because they do not currently exist in the land registry. Interviewee #10 (2021) argued that the biggest problem in the country is around the properties that reside within communal land and informal settlements without formal security of tenure and the title deeds:

I think what is really needed in our country is to increase the security of tenure, I will suggest there is probably somewhere, maybe 15 million families that actually live in lesser security tenure in our country. They need to be given formal tenure that can have that security of tenure that comes with a title deed. We have at least 15 million households in these communal areas which are open to abuse, and it is because they do not have sufficient security of tenure and their rights are actually trampled on.

(Interviewee #10, Zoom Interview, December 2021)

The absence of security of tenure for some of the citizens is an indication that the land registry public good in its current form is not serving the entire population equally, as urged by Samuelson (1969).

6.6.2 Lack of Systems to Detect Corruption and Fraud

Currently there are no adequate automated, paperless, electronic, or online controls and systems with less manual intervention to assist the Deeds Office to become more proactive in terms of dealing with corruption and fraud issues. Interviewee #7 (2021) admitted that they are not able to automatically detect all corruption and fraud unless it gets reported to them:

We only become aware of fraudulent or corrupt transactions if that is brought to our attention. We don't have a mechanism to identify fraudulent or corrupt transactions unless it is blatant and you can see from the document that the signatures are not the same or the owner is not the same with our records, in that case you can pick it up from our system.

(Interviewee #7, Zoom Interview, August 2021)

Blockchain could provide the mechanism to help detect and identify some of the fraudulent or corrupt transactions. Themistocleous (2018) suggested that the application of a blockchain land registry solution could eliminate land title fraud and guarantee seamless protection of property titles and maximised security.

6.6.3 Lack of Transparency

Interviewee #2 (2021) indicated that in terms of the cash transactions, banks are not involved; and the limitation is around the fact that cash transactions do not go through the robust verification process of bonded transactions. This can potentially enable some elements of corruption and fraud. For example, property and land valuations can be understated or overstated to enable bribes and fraudulent transactions. Since the conveyancers will still process a transaction, principal-agent problems where the estate agent or conveyancer can process a transaction for the benefit of either the seller or a buyer by overstating or understating the valuation in exchange for a bribe. The fact that the banks are not involved in the cash

transactions is another example of reduced transparency due to fewer stakeholders participating in the transaction. An estate agent interviewee (#2, 2021) described this by saying:

If it is a cash transaction, then that is different. So, when the bank gets involved in the process, it will say hold on that is not going to happen, what is going on here, we do not like that value. So, yes you will find that they are those situations, but only in cash sales.

(Interviewee #2, Zoom Interview, March 2021)

Interviewee #11 (2021) highlighted current information asymmetry issues between the buyer and a seller due to lack of transparency and the principal-agent problem in terms of how estate agents manipulate the Offer to Purchase or Sale Agreement for the benefit of either the buyer or the seller. Due to lack of transparency between buyers and sellers, estate agents take advantage of the fact that the buyer does not know how much the seller asked for. This is because the document is controlled by the estate agent, and it is a discussion between the estate agent and a seller. It becomes a tool that enables principal-agent problems between the buyer or seller and the estate agent:

What estate agencies have a tendency to do is that they come with the Offer to Purchase, one copy they give it to the purchaser to sign and complete the documents, then the next step is for the seller to go and sign, so that this offer can become a valid offer and then estate agent can submit to the conveyancing attorneys. Between them having given the first person to sign the offer, obviously once they do that they don't give the purchaser a copy because their excuses is that it has not been accepted and the same copy needs to be signed by the seller.

(Interviewee #11, Zoom Interview, July 2021)

Moreover, Interviewee #11(2021) further explained how estate agents raises their commission by deceiving both buyers and sellers because of the power and control the estate agent has in terms of controlling the Offer to Purchase:

If you have discussed with the purchaser to say for example, the property would be R750k... he will just put R750k or neglects to put it and also you will find that, there is a commission discussed of 3%, when the estate agents gets to the other side he changes commission to 5%, where the purchaser has initials, he cancels the written R750k and put R850k. All of those things that happen because the other party does not have a document to rely on. It is always the word against the person who has the document and we know that in law it is always difficult to prove when you don't have substantiated document, so we constantly now have to deal with all of those issues. (Interviewee #11, Zoom Interview, July 2021).

Interviewee #11 (2021) argued that if the process becomes digital, the process could become transparent to both the buyer, seller and an estate agent which will prevent the principal-agent problem where the estate agent as an agent deceives the principals:

So, I do really think that if it was done through another process other than the one that only empowers the estate agent to have a copy, for example you spoke about being digitised or being online, then obviously it will allow the other party to have a copy of the transaction that they initially agreed upon. (Interviewee #11, Zoom Interview, July 2021).

Interviewee #11 (2021) highlighted other transparency issues that buyers and sellers are faced with because of the dependency on estate agents and conveyancers which can also enable collective action problems whereby both the estate agent and the conveyancer collude to deceive either a buyer or seller due to common interests in the transaction:

You insist on being given the details of the conveyancer and you are then able to liaise directly with the conveyancer for any update or progress with regards to the status of the transaction, status of the transfer or status of whatever you will need in relation to that transaction. You will find that you have a conveyancer that is cooperative with you as a consumer, you would obviously have information, obviously you will have to follow up because if you don't follow up, the conveyancer only updates the estate agent only and not any other party.

(Interviewee #11, Zoom Interview, July 2021)

Interviewee #11's (2021) views and responses suggest that a lack of transparency forces buyers and sellers to rely on both estate agents and conveyancers and this can lead to estate agents or conveyancers taking advantage of both buyers and sellers. In line with the Constitution of the Republic, as highlighted by Pienaar (2009), transparency must be fostered by providing the public with timely, accessible, and accurate information. Blockchain could increase accessibility and transparency and empower buyers and users to have more control and visibility using blockchain features such as smart contracts.

6.6.4 Lack of Accountability

Currently there seems to be no accountability for those involved in corruption and fraud due to a lack of evidence that can assist investigators and frequent changeover of investigators who never get to complete their investigations. Interviewee #7 (2021) highlighted some of the challenges of ongoing investigations with perpetrators not brought to book or held to account:

Sometimes there are forensic investigations where it involves money into bank accounts and they are also officials who have criminal cases against their names still in the employ of the department, but, you know, with our experience with the police is that the investigators, some will investigate, they don't have all the information about

the syndicates and therefore they will close the file because of not having enough information or evidence. Then there comes a new investigator, then reopens the file and you start with investigation again and, before you know it, they changed the investigators again.

(Interviewee #7, Zoom Interview, August 2021)

Interviewee #20 (2022) suggested that tribal leaders do not have the records because it helps them to avoid accountability:

Another problem is tribal land ownership. I understand there is a lack of records, because tribal leaders do not want to record what people pay, effectively it comes down to corruption, they want to avoid accountability.

(Interviewee #20, Zoom Interview, November 2022)

Blockchain could provide cheaper, easier access for the land registry to accommodate the current underserved property markets such as subsidised houses and properties within communal land and informal settlements that do not have security of tenure or no title deed records in the land registry.

6.6.5 Lack of Consumer Awareness

The PPRA suggested that some buyers and sellers lack knowledge about processes, and this also contributes towards corruption and fraud when they get taken advantage of:

I think most of those that we have come across is lack of education on the part of the consumer and just them being gullible when they see an estate agent, obviously they do not do proper research, investigation and without them having the information of how they can protect themselves, I think that is how they land themselves into all of

this problem.

(Interviewee #11, Zoom Interview, July 2021)

Furthermore, a lack of awareness by buyers and sellers on the services provided by some of the stakeholders within the real estate sector is one of the contributing factors towards corruption and fraud:

One of the things that we have realised is that, although as an institution, even if we are there, a few people know about us, a few people really understand what our mandate is, and a few people really understand what you must look out for when you deal with an estate agent to the extent that they are so trusting of their heart and money to an estate agent when that person is really a fraudster.

(Interviewee #13, Zoom Interview, June 2021)

Bjerke-Busch and Aspelund (2021) suggested that, in the public sector, digital transformation is not merely about converting manual tools to digital tools, but also about improving policies, work processes and operations, and this can be achieved through training and consumer awareness as well.

6.6.6 Lack of Access to the Land Registry

Interviewee #13 cited lack of access to conveyancers and the land registry as one of the challenges around government-subsidised houses, which also exacerbates corruption and fraud:

Where it doesn't apply so well, it is in the low-value properties where other things are happening, people don't have access to the conveyancers, because they cannot afford to pay for the conveyancing fees or whatever, so, in those cases you can have situation where people transact informally because they think just the way we do it here rather than transacting formally, and there are people who sell those properties multiple

times, we have seen that.

(Interviewee #13, Zoom Interview, August 2021)

CAHF also mentioned that other market segments, such as properties within communal land, do not have security tenure and a lack of access to the land registry by some of property owners creates an environment where occurrence of corruption and fraud is possible:

The opportunity for corruption and fraud to be there is greater, when you have a situation wherein people are transacting informally or where people trust the Deeds Registry and cannot access it.

(Interviewee #13, Zoom Interview, August 2021)

Interviewee #11 (2021) suggested that the current land registry is not easily accessible by buyers and sellers during the transaction life cycle, which forces both buyer and seller to rely on estate agents and conveyancers:

I think also the services are not easily accessible, mostly because once the estate agent takes the Offer to Purchase, the only thing that the buyer and a seller need to do is to keep following up with the estate agent. If the estate agent doesn't provide progress of what is happening with the Deeds Office or what the attorney is saying, then they don't have any information as a seller or a purchaser.

(Interviewee #11, Zoom Interview, July 2021)

Another principal-agent problem between buyers or sellers with public officials can occur wherein buyers and sellers are motivated to engage in corruption by bribing some public officials to save on some of the costs:

We do have prescribed fees that we charge for whatever service we do, for instance when we give you information on a summary form, you have to pay R12, when we

give you information on a title deed, you must pay R12 plus almost R90, so it will be like R112.

(Interviewee #7, Zoom Interview, August 2021)

However, the Deeds Office argued that the land registry is available to all citizens and currently generates its own revenue by charging a fee on the services they render. The Deeds Office defended charging for services by saying that it does not get any subsidy from the government fiscal budget:

Our records are also public records, we do have the Deeds Registry System, where the banks and people who are affiliated are able to check the progress of their transactions.

(Interviewee #7, Zoom Interview, August 2021)

There are also commercial third-party data service providers that make the deeds registry information available to the public for people like estate agents and conveyancers at a cost:

I pay a fee to the Deeds Office, if the Deeds release the title deed to me, there is a fee payable. So, the services are there, as conveyancers we enter business relationships with the service provider so that we could access the Deeds Office through these systems.

(Interviewee #3, Zoom Interview, June 2021)

Moreover, the Deeds Office also admits that the current DRS is not easily accessible because of the payable fees and the fact that one needs to appoint a lawyer who is a conveyancer:

Those people who are poor, who are not able to pay for the fees that we ask for, you can say the whole system is not easily accessible. Not everyone can afford the services of a lawyer, so those of our people who are poor, you can say to a certain degree they

don't have access, the problem is lack of accessibility.

(Interviewee #7, Zoom Interview, August 2021)

Interviewee #12 (2022) further argued that property owners in the low-income market cannot afford to use conveyancers:

It is very expensive for people to use a conveyancer, so people will transact informally, and the sellers will claim that they haven't fraudulently sold their property while they have.

(Interviewee #12, Zoom Interview, March 2022)

Furthermore, Interviewee #7 (2022) concluded by saying that this can be resolved by introducing satellite Deeds Offices in some districts:

So, when we talk about accessibility, let's talk about satellite Deeds Offices in the districts instead of having multiple registrars and multiple institutions registering. So, what I would implore, if we are talking about accessibility, let us look at the issue of fees, let us look at structural issues like moving of conveyancers and Deeds Office must have district offices where people will not be forced to drive to Pietermaritzburg to access the Deeds Office, but rather they should go to their municipal offices where there are going to have satellite Deeds Office within the municipal offices assisting them.

(Interviewee #7, Zoom Interview, August 2021)

6.6.7 Lack of Reliability of Records

There is also evidence that, from time-to-time, the documents lodged with the Deeds Office get lost due to the volume of papers that the Deeds Office must process daily, and the paper-based

process is one of the main drivers of the current inefficiencies which enable corruption or fraud and contribute to poor implementation of land reform:

So, because it is not electronic, I am saying one of the advantages of going electronic will be to deal with the volumes. You will find it so interesting if you have to go to the Deeds Office and just see the volumes of paper and transactions that get lodged at the Deeds Office. I mean it is a huge task, it is an important job, it is a huge responsibility of the Registrar to manage all of that, its paper, upon paper, upon paper, but we are working with human element, we are working with people and the document goes from one person to the next person, to the next person, to the next person and, yes, of course it has happen before that a page goes missing or a document in the batch goes missing.

(Interviewee #3, Zoom Interview, June 2021)

Interviewee #20 (2022) highlighted some of the current inefficiencies that lead to inaccuracies and makes the land registry data and information unreliable:

What is problematic at the moment is that the current system is unable to categorise some of the types of properties and ownership, for example, there are areas wherein leasehold situations occur, somebody effectively owns the house, but it is not registered in the Deeds Office so their gaps in terms of how things are captured that don't reflect the current market dynamics. Another one is lease blocks, you can't get a true sense of the number of units, the value of those units, number of occupants if it is a lease blocks situation. RDP housing is another one and it is very difficult to accurately reflect ownership on those houses.

(Interviewee #20, Zoom Interview, November 2022)

Furthermore, Interviewee #20 (2022) argued that informal transfers cause inaccuracies that make the land registry data and information unreliable:

You end up getting informal transfer of properties, properties being passed from person to person without formal registration. That causes a mess and results in inaccuracies and inability to rely on the land registry and the drivers are the costs of transfers, accumulated municipalities bills resulting in ability to transfer. (Interviewee #20, Zoom Interview, November 2022)

6.6.8 Fragmented Deeds Office Processes and Systems

Currently the Deeds Office registration functions are fragmented, and each provincial jurisdiction has its own Deeds Registrars who are only restricted to register properties within their provincial jurisdictions. The registrars can potentially collude and share documents to facilitate fraudulent transactions in other jurisdictions. This restriction also contributes towards delays and backlogs in terms of processing the deeds transfers and title deeds registration:

I cannot register properties from other provinces because my jurisdiction is KZN. I only register properties in KZN, but I can also check who owns a certain property in Free State, because I can go into a system, but in terms of the jurisdiction it is only KZN for me. A Registrar of Deeds in Free State can only register deeds in Free State relating to immovable property. With regards to other things like your notarial bond and so on, depending on where your office is, your head office, your notarial bond will be registered where your office is, in terms of an immovable property. I can only register an immovable property with my provincial jurisdiction.

(Interviewee #7, Zoom Interview, August 2021)

6.6.9 Lack of Systems Integration for Other Key Stakeholders

Evidence suggests that the current land registry is not integrated with some of the key stakeholders' systems to make the process seamless and avoid manual intervention. Municipal systems are currently not integrated with the land registry to obtain municipal rates and clearance and, according to Interviewee #3 (2021), this also contributes to the delays of processing deeds transfers and title deeds registrations:

That's probably the most problematic part of the transaction, is waiting for that, that's probably where the biggest weakest link is because that information could be acquired quicker, the whole process could be a fraction of the time. Generally, the Deeds Office is efficient, but there are issues, it happens, you know systems are offline and documents get lost but generally my experience with them is good.

(Interviewee #3, Zoom Interview, June 2021)

6.6.10 Paper-Based and Deeds Transfers and Title Deeds Registration Processing Delays

Although the majority of the interviewees for this thesis praised the Deeds Office and the land registry as one of the best in the world, it is still faced with a lot of inefficiencies that normally cause delays in processing deed transfers and title deed registrations. It is still taking longer to transfer and register a property in South Africa due to manual processing, and this can also create a fertile environment for corruption and fraud whereby processes and documents can be manipulated. Interviewee #3 (2021) indicated that:

Once the attorneys are ready to submit to the Deeds Office, it's normally a 10-day turnaround time. I think the standard to transfer a property in general is three months, and only 10 working days of that is at the Deeds Office. What takes time is calling for rates clearance figures which comes from the City of Johannesburg [or the relevant

municipality].

(Interviewee #3, Zoom Interview, June 2021)

The delays in processing the title deed registrations will negatively impact the land reform implementation with its success dependent on security of tenure. According to Interviewee #20 (2022), there are still lot of paper-based processes with manual interventions and system downtime contributing to the processing delays:

There are still a lot of paper-based systems, which I believe are in the process of moving into an electronic registry management system, currently it is a paper-based system. It is enormously slow and is dependent on people. Another one would be system outages, there is sometimes downtime on systems from time-to-time.

(Interviewee #20, Zoom Interview, November 2022)

6.7 Deeds Office and the Land Registry Decentralisation

6.7.1 Decentralisation for Effective Governance

Instead of relying only on the Deeds Office, a strong case for anti-corruption and anti-fraud measures would be a decentralised environment with digital channels used by various selected administrators who will become verifiers as part of the new decentralised blockchain land registry administration network to collect and verify documents and process transactions in a transparent manner:

We want things immediately, we want these data, we want it to be available and what the blockchain is saying is that you can have the government to dissolve power such that other people are verifiers, so you can have exactly in real time if there is a mortgage in real time, everyone also can see that transactions is in process on the land

registry.

(Interviewee #14, Zoom Interview, June 2021)

With a decentralised land registry that enables the government to appoint verifiers, this can also potentially boost capacity to deal with the registration of title deeds for the majority of properties that reside within communal land and informal settlements. Interviewee #14 (2021) argued that, in a decentralised environment, fraud by duplicating the same transaction can also be detected:

If you and I are trying to buy the same house, we both start the process at the same time, the land registry will recognise it until one completes a transaction so there can be no fraud in the middle, where people are selling houses twice as you can't verify it on the registry currently.

(Interviewee #14, Zoom Interview, June 2021)

Decentralisation can enable other organisations such as the PPRA to form part of the land registry administration network and monitor their members and their transactions, which can also assist in dealing with corruption and fraud involving estate agents:

We would obviously see each and every transaction that goes through the Deeds Office, and it is put through by a conveyancer and an estate agent. We all know that some estate agents are not registered with us as the Properties Practitioners Regulatory Authority. We will get to know all these unregistered estate agencies because they are reported by the consumer. Without the consumer reporting we are unable to know. It is like a crime, it must be reported by someone before the police can know about the crime.

(Interviewee #11, Zoom Interview, July 2021)

Contrary to the evidence suggesting that decentralisation can provide more benefits to all the land registry stakeholders, the Deeds Office questioned decentralisation involving institutions such as the banks suggesting that it will not necessarily add value. The Deeds Office also questioned if this approach would also apply to other government institutions such as the DHA:

When you are talking about the blockchain, let's take it outside the Deeds Office environment, if you want ID, you no longer go to Home Affairs, but you go to the bank. If you need to register your marriage, you don't go to Home Affairs, you go to the banks. Now the question is, what positive impact will that have? Will that increase the number of people applying for the IDs? Will that increase the number of people registering for a marriage? For me, when the banks do that, it does not increase the ownership as such because the very same people who are supposed to come to the Deeds Office will be going to the bank.

(Interviewee #7, Zoom Interview, August 2021)

An online decentralised land registry will not only bring other external parties to form part of the land registry system but might also facilitate an effective deed transfer examination carried out by examiners. This means any examiner from any province will be able to examine any deeds transfer and this will do away with the current provincial jurisdiction limitation or restrictions:

Online land registry also with integrated information, even if the deeds involving Pietermaritzburg can be examined by someone else in Johannesburg because that person would have everything in front of him or her.

(Interviewee #7, Zoom Interview, August 2021)

Moreover, Interviewee #7 (2021) also argued that the same working arrangements exist in other government institutions such as SARS:

There are people in the background who can assess your e-filing and they are not necessarily from that SARS office where you filed your returns. So, with online, if it could be made accessible to the whole country especially for smaller offices where they don't have lot of work, they are going to relieve bigger offices and that will result in fast tracking of transactions.

(Interviewee #7, Zoom Interview, August 2021)

This also means that, with the online land registry, the Deeds Office could have capacity to deal with the pending land reform title deeds registrations as a result of the current lack of security of tenure for the majority of citizens if officials from smaller offices could also be involved.

There are also questions on which key stakeholders will be willing to form part of the decentralised blockchain land registry administration network and what the incentives and qualifying criteria will be to ensure that there is an increase level of transparency, accessibility, auditability, security, reliability, and accountability. For example, Interviewee #13 (2021) ruled out the possibility of private organisations participating in terms of managing day-to-day deed transfers and title deed registrations as part of the new decentralised blockchain land registry administration network:

It is not really the role of Centre for Affordable Housing Finance in Africa to do that, we are not going to be administrators within South Africa's property system, we are interested in making sure that there is a system that allows for low-income people to be included with their low-value properties in the functioning of the economy. What we have been proposing is that the technology and blockchain is very useful in this part, creates an opportunity for a one-stop-shop, where you can integrate your Home Affairs data, your municipal data, your deeds registry data, your housing subsidy data, all in the same database or your companies database, and if you have all of those databases integrated together, you can definitely set up ways to check against fraud

and corruption.

(Interviewee #13, Zoom Interview, August 2021)

The Deeds Office agrees with the concept of decentralisation; however, they do not believe other institutions should be involved:

Having a developer registering a property and so on, for me I don't see it as accessibility, but I would rather say, let's have one institution, but this one institution must be opened up in such a way that we have the provincial office, then you have a district office, satellite offices for accessibility.

(Interviewee #7, Zoom Interview, August 2021)

As an example of the danger of inviting in other organisations to help administer the land registry, the Ingonyama Trust was created to oversee communal land granted to the amaZulu monarch in KwaZulu-Natal province as part of the land reform programme and now owned by the monarch through the trust on behalf of the isiZulu-speaking people. But in 2018/9, the Trust collected about R90 million in lease fees in the 2018/19 financial year and was ruled against by the courts, saying that their residential lease programme was unlawful (Parliament of the Republic of South Africa, 2021). The Deeds Office also highlighted current issues with autonomous independent structures like the Ingonyama Trust and indicated that the same issues can possibly occur when there is the Deeds Office decentralisation which can involve other key stakeholders through PPIs:

If you go and read what we call this Ingonyama Trust, there are a lot of issues with registration of property where one property was offered to different people and different people are sitting with documentary proof that they are owners.

(Interviewee #7, Zoom Interview, October 2021)

Interviewee #10 (2021) also cited the Ingonyama Trust as one of the failures of decentralisation where power is given to the kings or chiefs to allocate the land and argued that this has increased corruption and fraud:

You got a big piece of land and its actually owned by South African government, they give the Chief rights to guide in terms of size and who can live within that land, then they register lesser form tenure of that property, it doesn't give homeowners the protection. What I learned in the media a while ago about the abuse of the Ingonyama Trust, by the way of example, suddenly wanting to consider themselves as the owners of that land, wanting to charge families residing on that land and then giving out rights entitled to shopping centres in those areas and so on. What you really want to avoid is that lesser form of tenure that doesn't protect the vulnerable in our country and the way you do that in my view, you give them increased security of tenure, the title deeds to their properties.

(Interviewee #10, Zoom Interview, December 2021)

However, despite some of the land reform inefficiencies as a result of decentralisation, Interviewee #10 (2021) also suggested that decentralised blockchain land registry is possible and can be done, and highlighted a similar project within the financial services sector that automated a paper-based financial markets trading environment into an electronic trading environment, whereby a private company called Strate which is owned by the Johannesburg Stock Exchange (JSE) is the custodian of the decentralised financial markets database and all the banks participate in the platform to trade various financial markets transactions instruments electronically with various counterparts or stakeholders within the financial markets. Interviewee #10 (2021) cautioned by saying that this caters for the tech savvy and therefore may not be easily accessible to all:

The JSE converted to a digital platform some years ago through the creation of Strate and there are a number of blockchain-based entities that have sprung up since then. These have all been highly successful. One word of caution though, this caters for a sophisticated market who is tech savvy.

(Interviewee #10, Zoom Interview, December 2021)

Interviewee #20 (2022) argued that there has to be a careful consideration when transitioning to a decentralised environment due to the complexity of data and rules:

At this stage, the data and the rules are extremely complex at the moment. I am all for transparency and I am all for a system which is more efficient in terms of the contributions for each party to make it work, but I think it has to be carefully set up to ensure that the right outcome is achieved due to the complexity of the system.

(Interviewee #20, Zoom Interview, November 2022)

6.7.2 Land Registry Decentralisation Possible Reforms

The choice for the blockchain deployment model to enable the decentralised land registry needs to be carefully assessed, taking all the key stakeholders' mandates and interests into consideration, and avoiding exacerbating corruption and fraud instead. Interviewee #13 (2021) alluded to the fact that this will also depend on the PPI setting and the incentives that come with it:

There are two options, the distributed ledger that you will have to choose. In property, I think you have to think quite carefully about to whom it must be distributed to and how you manage that and what is the role of each player. Public-private partnerships I suppose, but you have to be very careful about the incentives and accountabilities that exist within that framework. We have been playing around with that concept, what level of distribution will be useful, is it as open as Bitcoin? I do not think so, is it only

a one-to-one, which is the way the Deeds Office works right now, well it needs to be more transparent.

(Interviewee #13, Zoom Interview, August 2021)

Another respondent argued that already there are private players and perhaps what is important is to assess the role they can play in a decentralised blockchain land registry in order to increase transparency, accessibility, auditability, security, reliability and accountability:

The way the property system works is that it's already connected with the private sector. South Africa has the Conveyancing Act, you need conveyancers who buy properties from developers, developers originating mortgages to the banks, and it's already an integrated system.

(Interviewee #14, Zoom Interview, June 2021)

However, the current environment does not allow other parties to process deed transfers and title deed registrations and only the conveyancers are allowed to lodge deed transfers with the Deeds Office. Decentralisation of the land registry system can also be extended to buyers, sellers and communities. Effective governance can be achieved by empowering and granting access to stakeholders such as buyers, sellers, beneficiaries of land and communities at large with a system that allows them to also capture, collect and supply all the necessary documentation required for deed transfers, which might reduce estate agency and conveyancing costs for the middle- and high-end property market segments. This might also speed up deed transfers and title deed registration processes.

Regarding the land reform, beneficiaries and administrators of subsidised and affordable housing can also capture, collect and supply all the necessary documentation required when they register for the first time on the waiting list within their respective communities. The same process can be followed by other stakeholders dealing with other land reform programmes. For

example, DALRRD officials could use the decentralised blockchain land registry public good for the allocation of state land to black farmers. Key stakeholders dealing with the agricultural land like the Land Bank can also form part of the decentralised blockchain land registry and have their own conveyancing unit servicing their land reform beneficiaries, while their transactions can also be scrutinised by other stakeholders because of enhanced transparency. Interviewee #13 (2021) further argued that decentralisation can increase accessibility and reduce costs:

The intention is that blockchain registrar, was something like community-based registrar that people can continue to put their information onto it as the property changes over time, that's kind like a mammoth exercise to encourage people to participate in and that's sort of what we are thinking now if this is sustainable, because in principle it should be more accessible than going to town and try to find yourself a conveyancer and getting them to effect a transaction. If you could put your interim information onto a blockchain by just going to a church in your neighbourhood, right, and if you can put that information on, technologically the conveyancer should be able to effect that transaction by just looking at that data and that should make things cheaper so that the services are not so high.

(Interviewee #13, Zoom Interview, August 2021)

Beneficiaries of subsidised and affordable houses and citizens that live within communal land and informal settlements might still require assistance, either through registrars, administrators or Deeds Office officials operating within their communities. However, the decentralised land registry as a public good will likely be welcomed and easily adopted in the middle- to high-value markets because of the potential savings that could be introduced if buyers and sellers themselves are empowered to drive certain processes, especially uploading all the necessary documents required for transfers without relying on estate agencies and conveyancers. For example, buyers and sellers of properties that are worth more than R1 million who are required

to pay transfer tax duties and other costs may become the early adopters of the decentralised land registry public good.

6.7.3 Conveyancers Role in a Decentralised Environment

Although the decentralised blockchain land registry will bring more efficiencies by automating most of the conveyancing processes, which likely might bring the costs of deed transfers and title deed registrations, other interviewees still believe conveyancers will play a key role in a decentralised environment:

Blockchain creates an opportunity for greater access by more people into the system and reduces the costs of the system. So, it should, over time, be able to encourage participation in a form of property transaction process. If that happens, it will reduce the incidents of fraud and corruption because you will have more people engaging formally rather than informally. Critically, at the very least having everything digitised, that can make a big difference and then if the blockchain is monitored by the public or it is monitored by just one person. I do not think it can be monitored by the public in the same way as Bitcoin is. I think it is different, because the assets are greater and that means there is more competition around it. I think you still need the role of a conveyancer to adjudicate whether something or not should go on the blockchain and once it is there you can see it.

(Interviewee #13, Zoom Interview, August 2021)

The land registry going online or becoming electronic could bring more efficiencies. However, a conveyancer argued that, even after the digitisation and the automation of the Deeds Office processes, human intervention will still be required to verify the entire process which will continue to give title deeds in South Africa the necessary credibility:

The huge responsibility that is put in the shoulders of the conveyancer, that is not going to go away, even if it becomes electronic, the process needs to be managed, even if it is electronic, it still needs to be managed by human elements, it needs to be managed and it needs to be managed properly.

(Interviewee #3, Zoom Interview, June 2021)

Interviewee #3 (2021) further highlighted the need for human interventions and conveyancers' involvement in the electronic environment and argued that a system is just a system:

I still believe it still has to be properly managed by us as conveyancers, otherwise it is just a system. Buying and selling a property isn't just about getting the ownership, getting it as quickly, as speedily, and as easily and as legitimately as possible. It is about holding a person's hand through that process, explaining the process to them, so that they understand what it means and what they are doing in the process. For that, the human element is still very much needed to be part of the process.

(Interviewee #3, Zoom Interview, June 2021)

6.7.4 Deeds Office Role in the Decentralised Environment

Interviewee #14 (2021), from blockchain solution provider Seso Global, also believes that the Deeds Office will still play a key role in a decentralised environment:

I think they would just be the authenticator, and maybe store the title and they can hold an additional copy, you know maybe there. If you look at it, like, say everything like building a consensus model, so you need the people to do the consensus, to look at the transactions, the mortgage maybe the consensus is given between the buyer, the seller, the mortgage bank, the conveyancer, but those changes depending on what property, what buyer, what conveyancer. The Deeds Office would be a consistent authenticator that will be like a permanent one and maybe with multiple people within

their office.

(Interviewee #14, Zoom Interview, June 2021)

Interviewee #7 (2021) also argued that stakeholders such as banks normally charge a fee for the services they provide, and if they are allowed to form part of the new decentralised blockchain network of administrators and perform some of the conveyancing responsibilities on behalf of their clients it is likely that they will not do it for free. Moreover, Interviewee #7 (2021) also argued that the success of decentralisation, which will include other private sector players such as banks, can only be achieved if such stakeholders offer Deeds Office services for free:

It can only increase the accessibility and ownership of the land if they do that for free, if they remove the intermediary between the two, then people will go to the banks, represent themselves and do the transactions there, but as is now in terms of our system and in terms of our structure, we do have intermediary in between.

(Interviewee #7, Zoom Interview, August 2021)

6.8 Deeds Office Digital Transformation for Effective Governance

The Deeds Office has already embarked on a digital transformation journey and is currently implementing the EDRSA which requires deeds to be registered electronically. The Deeds Office can further drive the digital transformation programme by adopting blockchain technology and integrating it into the current online DRS to enhance the current levels of transparency, accessibility, auditability, security, reliability, and accountability. Interviewee #3 (2021) argued that an electronic system could bring other benefits which includes efficiencies to deal with the volumes of deed transfers and title deed registrations and delays in processing deed transfers and title deed registrations:

There are benefits to an electronic system, dealing with the volumes, streamlining the process, expediting the process.

(Interviewee #3, Zoom Interview, June 2021)

The core objectives of the Deeds Office's digital transformation programme could be to implement an inclusive and integrated land registry, digitise the current paper-based deed transfer and title deed registration documents, automate the current manual processes, and facilitate change management for a successful adoption of the blockchain-based land registry.

6.8.1. Digital Transformation to Implement an Inclusive Land Registry

Digital transformation could focus on the implementation of an inclusive land registry accessible by the majority to support land reform for the restoration of justice. Interviewee #13 (2021) argued that the current land registry only caters for middle- and high-income properties and there is a need for a system that can adequately address the needs of the middle- and lower income properties in a cheaper and easy way:

The electronic Deeds Registration System now is designed for middle-income and high-income properties, it is designed for that market, but there is a need to re-think about middle-income and lower income properties. I don't think it's sufficiently thinking about the lower value properties, and one has to bring that in. I think it is a useful experiment for highlighting what the opportunities are, I think there are great opportunities. We had discussions with our colleagues in Angola to apply it in Angola, I know they are doing similar things in Kenya. There is a lot of interest in how you think about land rights for very low-income people who have low resources and complex relationships, and how do you capture that. I think that blockchain is an efficient technology that should make that cheaper and easy.

(Interviewee #13, Zoom Interview, August 2021)

6.8.2 Digital Transformation to Implement an Integrated Land Registry

Through the implementation of the EDRSA, the Deeds Office can deliver an integrated land registry public good. This could help deal with the current subsidised housing title deed backlog, pending title deeds on properties from communal land and informal settlements and possible title deed registrations for other land reform initiatives such as the allocation of state land to black farmers, should the government decide to go ahead with its plans. To make sure that there is an inclusive, complete, and integrated digital land registry with all the electronic deeds transfers and title deeds in South Africa, the Deeds Office suggested that data migration of the existing deeds transfers and the title deeds needs to be considered first. As part of the digital transformation, data migration will be required to ensure that all the existing title deeds are digitised and migrated into the newly integrated decentralised land registry system. Moreover, the Deeds Office has indicated that they have also initiated a project to conduct digitisation of existing title deeds or documents, which suggests that the land registry digital transformation is already underway:

Internally, all these hard copies that we have in the Deeds Office must be digitised first, in other words they must be scanned first and be available not on a hard copy but become available electronically. There is a project where we are trying to scan all our hard copies so that they can be available electronically.

(Interviewee #7, Zoom Interview, August 2021)

Furthermore, according to Interviewee #7 (2021), the Deeds Office has initiated the digitisation programme to implement the EDRSA:

I know when Electronic Deeds Registration System Act of 2019 was introduced, the intention is to have interfaces to ensure that there is a kind of a validation in place, ensure that the documents are in order, let's say now at the municipalities, SARS,

wherever, before registration happens, but we are not there yet.

(Interviewee #7, Zoom Interview, August 2021)

Interviewee #13 (2021) also suggested that how the new system interfaces with other systems is important:

I think the implementation of the electronic Deeds Registration System is important and how that integrates with our system.

(Interviewee#13, Zoom Interview, August 2021)

Interviewee #7 (2021) indicated that the end goal is to have a fully automated integrated land registry:

What we are looking for is an integrated land administration system. Now, what do we mean? We mean the stakeholders like your municipalities, like your Master of the High Court, like your High Court, like your South African Revenue Services, we need an integrated system. When you bring a transaction to me, you say here is a certificate from the municipality or here is a court order or here is a certificate from SARS. I should be able to go into the system and confirm what you have brought into my attention if it is the same that has been issued by those government institutions.

(Interviewee #7, Zoom Interview, August 2021)

The same sentiments were also echoed by a conveyancer, who suggested that some of the land registry key stakeholders; systems are already online and can be integrated with the land registry:

When they say everything is in order, and I have collected the tax from the buyer, I pay that to South African Revenue Service, via the SARS e-filing domain and SARS then issues me with the receipt which I print out and I can take to the Deeds Office.

So, SARS is as electronic as it can be at the moment.

(Interviewee #3, Zoom Interview, June 2021)

Interviewee #12 (2022) also believes that an integrated system is needed but argued that it does not have to be a blockchain technology-based solution:

We do need something which can manage a sequential process where every step in a process is properly recorded with all the entities involved in a transaction, they can see what is happening.

(Interviewee #12, Zoom Interview, March 2022)

Moreover, Interviewee #3 (2021) also indicated that some stakeholders have basic digital capabilities but are not integrated with the land registry, and still require manual intervention and as a result there are still delays in the process:

Some municipalities you can apply for the figures via email, they issue you with a reference number via email and sometimes some municipalities will even email the rates clearance to us. But in other municipalities you have to physically go stand in the queue and apply for the figures. You then need to go back and stand in a queue to pay the figures and then you need to go back and stand in a queue to receive the clearance.

(Interviewee #3, Zoom Interview, June 2021)

Although, some municipalities do not require conveyancers to physically go to municipal offices to queue for municipal rates and taxes and clearance certificates, a suitable solution would be an integrated land registry that obtains municipal rates and taxes and the clearance certificates in real-time. If municipalities have proper online systems, this information can become readily available and accessible via an integrated land registry system. Interviewee #3 (2021) also recommended that, if the Deeds Office becomes electronic, all other key stakeholders must also become electronic and be integrated into the land registry:

You can't just have the Deeds Office being electronic, every service provider, every government department, the whole supply chain needs to go electronic.

(Interviewee #3, Zoom Interview, June 2021)

An integrated land registry public good could serve all the land registry stakeholders and be able to provide the necessary data, information and reports that will assist them in performing their day-to-day tasks and to be able to fulfil their mandates. According to Interviewee #11 (2021), the PPRA is one of the organisations that can also benefit from an integrated land registry:

So, if you would have such a platform, we would be involved, then I think we will be able to see how many estate agents are involved in which transactions and who are those estate agents or whether those estate agents are registered or not.

(Interviewee #11, Zoom Interview, July 2021)

Interviewee #7 (2021) also argued that, for decentralisation to work if it does materialise, all systems need to be integrated to avoid double registration, for example:

To avoid double registration, if these systems are not integrated, we have our records, they have their own records, two or more people will be owners of the same property, to avoid that we need to integrate.

(Interviewee #7, Zoom Interview, August 2021)

Systems from key land reform stakeholders such as the DHS, municipal housing departments and the DALRRD can also be integrated with the land registry. For example, the current HSS managed by the DHS and municipal housing departments can also be integrated with the land registry. The two systems must reconcile to avoid things like double registration which could emanate from fraud or corruption.

Interviewee #7 (2021) concluded that, beyond the efficiencies, there is hope that an integrated land registry will also assist in dealing with corruption and fraud:

Hopefully soon we will have that integrated system that we will hope will stop some of the fraudulent and corrupt activities.

(Interviewee #7, Zoom Interview, August 2021)

The conceptual framework in Chapter 3 highlighted the relationship between institutional arrangements and PPIs to enhance the land registry public good. An integrated land registry could require actors or stakeholders, both public and private, to go online as part of the new institutional arrangements through PPIs.

6.8.3 Digitisation of the Current Paper-Based and Manual Processes

There is still a lot of manual intervention with the current online or electronic system, and it is still paper-based in some respects due to the current volumes of paper-based deed transfers and title deeds. According to the conveyancer, the Deeds Office have been moving from paper-based to digital in recent years and every transaction is microfilmed so that it can become digital:

Before I started as a conveyancer years ago, the way that the Deeds Office will record the registration of ownership, is that they would bind the title deeds in books and they will be stored in a room in the Deeds Office, and you could go there and make an application to see that deed, if you needed it because you are doing a transaction. That changed a couple of years ago, and now the Deeds Office microfilms every transaction.

(Interviewee #3, Zoom Interview, June 2021)

Interviewee #3 (2021) further described the paper digitisation microfilming process:

Part of the microfilming is obviously capturing the data, who the new owner is, on what property, what they paid, what was the value of the purchase price was, so it captures the details of property owner, value of the purchase price, was the property bonded, is there a bond holder, that bond also gets microfilmed and the title deed number and the bond number are recorded on the datasheet with the microfilm number and that's what get published.

(Interviewee #3, Zoom Interview, June 2021)

The current online system also allows conveyancers and other stakeholders to conduct searches on specific owners, transfers, and title deeds. However, Interviewee #3 (2021) indicated that the current online system is not a real-time system and there are delays in terms of processing the requested title deeds from the Deeds Office:

I apply for the copy of the title deed, I don't have to go to the Deeds Office to physically apply for it, I can do it online via the system that I have, and I get that title deed within a couple of hours to a couple of days depending on what the turnaround time is at the Deeds Office.

(Interviewee #3, Zoom Interview, June 2021)

This is an indication that the current online system is not efficient and effective, and blockchain can assist in addressing some of the inefficiencies. Interviewee #3 (2021) also indicated that property purchasing processes are also still paper-based and manually driven:

They are paper-based, it is just a lot, you know your offer to purchase, everything, everything is on paper. For example, your offer to purchase you must scan and email the other party to print and sign and email back.

(Interviewee #3, Zoom Interview, June 2021)

6.8.4 Digital Transformation to Facilitate Change Management (Raise Awareness, Facilitate Training to all Key Role Players and the Public at Large)

Interviewee #10 (2021) indicated that, although the digital land registry will work, older generation and uneducated people who are not tech savvy might be excluded from participating:

I am particularly concerned about vulnerable families, the poor, semi/uneducated technology families and in particular the older generation whose technology skills are not optimal. The scope for fraud/corruption increases substantially within these segments.

(Interviewee #10, Zoom Interview, December 2021)

Furthermore, Interviewee #20 (2022) highlighted the government's lack of technical capacity and the need to manage change, including behavioural change, if the land registry was to be decentralised to allow other participants to co-manage the land registry with the Deeds Office:

There are a number of complexities that have to be dealt with the right way. There is a required technical capability within government organisations, there is no great evidence for that type of thing working for South Africa at this stage. Besides from that, if you are trusting other people to input the correct information, if you have the right verifications mechanism in place, you also need to look at incentives of each of the participants and the motivations to change a behaviour because you are also asking people to change behaviour to make sure the outcome is still the right one in terms of accuracy, greater speed and accountability for the rights of access of information. So, I absolutely buy into the vision, I think it is the right thing, I think to get there from where we are it will require quite a lot of change and some of it is behavioural.

(Interviewee #20, Zoom Interview, November 2022)

To ensure the success of the blockchain-based land registry adoption, the Deeds Office could drive the digital transformation programme in a phased approach. Post-implementation, the Deeds Office could also facilitate change management by providing the necessary training to raise awareness about the new, decentralised, blockchain-based land registry and how it empowers key stakeholders and citizens at large. Relevant key stakeholders and government officials could also be upskilled to operate the new land registry.

6.9 Blockchain Technology Innovation for Effective Governance

6.9.1 Blockchain Value Proposition for Anti-Corruption and Anti-Fraud

6.9.1.1 Transparency and Accessibility

E-government and traditional database technologies have already digitised some of the land registry processes. However, blockchain will provide additional benefits around decentralisation which will increase transparency and accessibility. Interviewee #13 (2021) argued that blockchain will increase transparency and accessibility:

The important thing about blockchain is that it is accessible to people to record their transactions on the blockchain. So, that becomes easier than the way it is currently structured, certainly sellers who want to make sure that they are protected from the buyers. Most of the time it is not both parties that want to be transparent, one of them probably does, they would use that system to protect their interests by creating transparency. So, I think it requires the participation of a whole administration of different systems and the beauty of a blockchain system is that it can handle that. (Interviewee #13, Zoom Interview, August 2021)

Moreover, Interviewee #14 (2021) suggested that private companies, not-for-profit companies and developers within communities can also get involved and collect required data using the blockchain application, which will increase transparency and accessibility:

If this can really open, you will have more companies, more survey companies, more people wanting to offer this as a service to their local community. You can see that could be a fantastic solution, especially if there are local stats run, imagine every area in South Africa has many tiers of the Deeds Office where people can use the platform to get support and, through the conveyancer, interface with the government.

(Interviewee #14, Zoom Interview, June 2021)

Blockchain could enable the Deeds Office to increase the number of the third-party service providers servicing currently underserved markets such as townships and rural provinces. However, for the majority to access the land registry, third-party service providers that will be servicing these markets do not have to be commercially driven and charge fees for their services.

Interviewee #16 (2021) suggested that citizens can also access the land registry using mobile phones and this can increase accessibility and promote inclusivity:

The good thing about blockchain is that it allows every participant to be on the same level. So, if you have access to the blockchain platform and I have a smartphone as a citizen, I have access to the same information.

(Interviewee #16, Zoom Interview, March 2021)

Moreover, the more transparency and accessibility, the more the land registry public good will be able to assist in dealing with corruption and fraud. Interviewee #13 (2021) also believes that increased transparency and accessibility can be achieved through a private, permissioned blockchain but also argued that the solution does not have to be based on blockchain technology:

There are elements of distributed ledger technology which are very helpful, it doesn't have to be a blockchain, if you decide to have it, it is a private permission solution and

by no means a distributed permissionless.

(Interviewee #13, Zoom Interview, August 2021)

6.9.1.2 Security

According to Interviewee #14 (2021), paper-based title deeds were always subject and prone to manipulation, property owners also tend to misplace their titles and blockchain offers a secured storage for titles:

Land tenure security and you can easily store it with four individuals, so right now people will lose their title if there is fire, if there are natural disasters where people can have their titles stolen and that in itself has its own costs in South Africa.

(Interviewee #14, Zoom Interview, June 2021)

According to Interviewee #16 (2021), from blockchain technology solution provider Chromaway, every operation is authenticated:

Every operation is authenticated and has a restricted role and gets verified with a specific authentication because it is assigned a specific signature and because it is only allowed specific roles.

(Interviewee #16, Zoom Interview, March 2021)

However, Interviewee #16 (2021) also indicated that the same security measures can be achieved using other technologies:

I mean you can have a system not on the blockchain doing the same thing, using encryption on a centralised system. I think if you want to decentralise it you just need to make sure that the system scales in terms of the number.

(Interviewee #16, Zoom Interview, March 2021)

Although records within the blockchain are immutable, which is a key security capability, some stakeholders fear that going digital may subject the land registry system to new security threats such as cybercrimes:

I think we are also going to improve our internet stability to guard against hacking of our information system and avoid our system from being corrupted. Some days and some years, e.g. ABSA or FNB were double-debiting people, and people will be saying I paid this debit order, but the bank is debiting, and the bank will be saying sorry we had a system problem we are going to reverse. I can imagine in the Deeds Office, where hackers are hacking the system; fraudulently and corruptly they are transferring properties from the system, which is a bigger risk.

(Interviewee #7, Zoom Interview, August 2021)

6.9.1.3 Auditability and Reliability

Blockchain has the potential to provide valuable evidence in a form of historical data that cannot be tampered with and which can be useful during corruption or fraud investigations:

The critical issue will be that in order to address those cases, you need evidence, and that evidence is very useful held in something like a blockchain registrar. I think one, adding providence to be able to show the history and that really becomes ideal when it comes to court cases, on our pilot we always say we look forward to the time of those court cases and that the blockchain data we provide can be used as evidence in court to show the historic transactions and how the owners got to where it is, and a title got to where it is,

(Interviewee #14, Zoom Interview, June 2021)

Furthermore, Interviewee #13 (2021) also suggested that blockchain can provide the necessary tamper-proof audit trail that can come in handy in terms of the investigations:

It can record absolutely every step of the transaction, all the components of the transaction, every time you do something to the property, you log that on the blockchain, and it gets recorded and never gets deleted. You could see who puts that information into the registrar for that property and how that information gets amended by different people and you can see who did what amendment to this. So, it's a much more secure form of a database site.

(Interviewee #13, Zoom Interview, August 2021)

Interviewee #12 (2022) argued that it does not have to be a blockchain solution, but technology is required to guarantee auditability and reliability of the records:

As long as it is auditable and as long as every party knows what is happening in the system then it can work. It doesn't have to be blockchain but you are going to have to use technology to get this right, how else are you going to keep records and maintain your evidence in a way that it does not get tampered with? Those are the obvious applications.

(Interviewee #12, Zoom Interview, March 2022)

Blockchain could provide reliable evidence that could assist with investigations of corruption and fraud cases and could also help resolve current challenges of cases that drag on due to lack of information and evidence as suggested by some of the interviewees.

6.9.1.4 Automation of the Conveyancing Process and Electronic Records/Documents Management System to Drive Costs Down

In South Africa, two pilots were conducted in the CoCT municipality to demonstrate how blockchain can automate the conveyancing process and create an immutable record on the database in terms of which conveyancer was dealing with the transaction:

There were two pilots, the first pilot just went to the conveyancer, they interface with the conveyancer, the conveyancer will take it offline and bring it back online, the blockchain can know when the conveyancer did the transaction and be able to track which conveyancer did it. So, if there is an issue, we hold the conveyancer accountable. In the second pilot which was in Freedom Park, the government has agreed to actually validate the properties through the platform. So, how that will work, the surveyor goes through the survey, the government looks at the data, they can validate whether this person is eligible for an upgrade, then from there it will go to the conveyancer to do the upgrade.

(Interviewee #14, Zoom Interview, June 2021)

According to Interviewee #13 (2021), the project involved the enumeration of 1 000 households in Makhaza in Khayelitsha township in Cape Town, where households did not have their title deeds yet and had been waiting for years:

You have to figure out who is in what property? Are they supposed to be there? So we modelled that same process and we surveyed 1 000 households and information we collected from them, we put it onto the database which then was put into this blockchain, and we had to do things like collect IDs, so we took photographs for IDs and put them on, we had to collect marriage certificates, death certificates, and the subsidy approval letter.

(Interviewee #13, Zoom Interview, August 2021)

Furthermore, Interviewee #14 (2021) suggested that many people do not know how to register a title and their blockchain pilot platform provides foundational steps required for title registration normally done by the conveyancers:

There are a lot of people who don't know how to register a title, so how the platform works is that we had surveyors that were using the surveying app that is connected to the Seso API. They will survey the houses, understand if they need the registration, and if they need a title, was there a death and if they needed to change the ownership from the father to the son... things like that. Then once they realise what transaction the people needed, they got the details that was put into the platform, they had a user with all the documents to be able to create a case number for the client, and the paper transaction that they need to inform the house sale, registering of the deed, death in the family, and then that all went to a conveyancer and then the conveyancer took it to the government.

(Interviewee #14, Zoom Interview, June 2021)

The two pilots were made possible through a PPI between two private companies, 71Point4 and Seso Global, the not-for-profit CAHF, the Western Cape provincial government and the CoCT municipality. This has resulted in a case management platform with emphasis on collecting all the necessary documents required for deed transfer or title deed registration, a process normally done by estate agencies and conveyancers:

What the blockchain became for us, it became the case management platform, that's what we called it. So, it's a case management platform like in other companies but underpinned by blockchain, blockchain is important because it has a security rigour, that is appropriate for the seriousness of a title deed, and we have created this case management platform that provides stepping stones between formal and informal.

(Interviewee #13, Zoom Interview, August 2022)

However, Interviewee #13 (2021) indicated that the pilot was not a replacement of the land registry that facilitated the deeds transfers and issue title deeds:

We are not giving them a title deed from the blockchain system, we don't have that. What we say to you is give us your information; they sign a form to agree to that. We put it on the blockchain, for the household, they don't see whether it is a blockchain or database or whatever, it isn't an issue for them. We put it onto the blockchain and then get compared with the city's database. We use it to help the city identify who is the rightful owner to the property. So, we haven't promised title deeds, if we were able to deliver the title deeds it would be much more than what we promised.

(Interviewee #13, Zoom Interview, August 2021)

Moreover, Interviewee #13 (2021) indicated that the pilot was an on-boarding system with key ownership information for lower income properties:

So, we haven't created a replacement of the deeds registry. What we created is an on-boarding system for lower income households to get their properties onto the deeds registry, that's what we have created. What is useful about blockchain is that in terms of collecting the data that we have created from the enumeration process, it can be updated, so when somebody dies, you just add that to the information, you don't have to do the whole thing over again. You don't have a problem with spreadsheets where things get lost or deleted and the seriousness of the title deeds is sort of like a basic document of ownership right! The blockchain becomes quite a useful way of articulating that seriousness before you can actually affect that formal transfer.

(Interviewee #13, Zoom Interview, August 2021)

Based on the outcomes of the blockchain pilot that was conducted in Makhaza, blockchain has the potential to replace the current conveyancing process in terms of collecting the required

data. This might assist the government to remove the need for conveyancers for middle- and lower income properties. With a highly secured storage for transfer documents in the hands of not-for-profit organisations through PPIs, it could drive down costs and do away with the reliance on estate agents and conveyancers.

Moreover, Interviewee #13 (2021) indicated that their pilot is more like a staging site for the final lodgement of the deed transfers and the title deeds registration:

The government has probably subsidised about two million properties that have been built and that have been occupied, people are living in them, they have no idea whether they have been put on the national deeds registry, so, they don't exist. So, this blockchain starts to create a platform where you can register the rights of those people and clarify the rights of those people. When the rights were first allocated, 10, five, three years ago, it may have been to a person, but that person's situation may have changed. The big weakness in the title registration programme now is that the government has the protocol that they have designed, whereby they just issue title deeds in the name of the allocated beneficiary, but when three years lapse that beneficiary is entirely in a different place, different circumstances and sometimes they pass on. What the blockchain does, it gives you mechanism, before you go to that formal process of transferring that property, you actually make sure, 100% sure, that the person in the property is the person who is entitled to own that property. I see the blockchain platform as a staging site.

(Interviewee #13, Zoom Interview, August 2021)

This staging site could support land reform if the Deeds Office or municipalities enter PPIs with similar organisations to the ones involved in these pilots.

Furthermore, the pilot was not a complete digital land registry, but a staging site, which demonstrated that blockchain can provide secured storage to collect the required documents for transfers to the municipality, which is a critical function of the whole conveyancing process and title registration process. It is evident that blockchain could facilitate the collection of the necessary documents currently done by conveyancers and required for the lodgement of the deed transfers. If the government or municipalities could adopt and end up using this application, electronic title deeds for the lower income housing market could become a reality and the current title deeds backlog could also be addressed.

6.9.1.5 Data Migration and Digitising the Existing Paper-based Deed Transfers and Title Deeds

Given the current volumes of paper-based deeds transfers and title deeds within the Deeds Office, the full adoption of the digital land registry will require data migration and the digitisation of the existing paper-based documents in a form of scanning or the current Deeds Office's microfilming process:

I understand that the Deeds Office is currently transcribing all the paper onto an electronic platform where they are making electronic copies and that it is a big process. I think there is something like 400 or 450 million pieces of paper that are sitting in the Deeds Registry offices in the country, so they are in that process at the moment, and I think they are shifting towards dematerialisation of the Deeds Registry. (Interviewee #10, Zoom Interview, December 2021)

Interviewee #14 (2021) suggested that there are two approaches that can be followed:

There is really two approaches, there is one which is, you go to the government and digitise document-by-document, and scan all these documents or if you build in digital channels into the registry which is a concept for day-to-day digitisation, or if you

build, say, smart contracts into the government to receive the transactions, then as the registry term is over as more transactions happen, the registry would digitise itself.

(Interviewee #14, Zoom Interview, June 2021)

There are two possible options that the Deeds Office could choose from to deliver an inclusive, complete, secure, decentralised land registry through PPIs as suggested by Interviewee #14. The first option, which is currently underway, involves the Deeds Office digitising document by document. The second option is to appoint third-party service providers through PPIs to build digital channels that interface with the land registry through smart contracts similar to the Makhaza blockchain pilot. However, the second option could be extended to other municipalities and the government could have different PPIs for each province to give more private companies and other organisations an opportunity to participate.

6.9.1.6 Blockchain Land Registry Readiness and Adoption

Interviewee #14 (2021) emphasised that, when articulating blockchain value proposition to the government to get buy in, highlighting other benefits for the government can help accelerate the adoption of blockchain. For example, in the case of municipalities, they could recover lost revenue and be able to start charging for services provided to the beneficiaries of subsidised and affordable houses if there are tamper-proof ownership records:

We have shared that now with the City of Cape Town and what we demonstrated to them is that the blockchain provides municipalities with visibility. When you have someone living in the property, they don't have the title deed, but they are consuming services and the City has no one to bill for those services because there is no owner, so that means services are being provided for free. Once you have created municipality visibility, if there is some level of formality with the City, you can actually bill that household for the services they consume, and we have been working with the City to show them that this is an opportunity, we are quite keen to see it being adopted by

other cities, it is feeding into a rather awkward process that the Department of Human Settlements has been governing into dealing with the title deeds registration problems.
(Interviewee#14, Zoom Interview, June 2021)

Interviewee #14 (2021) suggested that the adoption of blockchain capabilities and advanced features such as smart contracts and the opening of the conveyancing process to more stakeholders through decentralisation might have an impact on estate agencies, conveyancers and other government officials' jobs, which can cause key stakeholders to resist and advocate against the adoption of blockchain:

Of course, it will really help with fraud if it is in real time and everyone is connected to it, but most government issues around land registry, what we are seeing globally is more of the jobs issue, where people can see that they will lose a lot of jobs with digitising the registry.

(Interviewee #14, Zoom Interview, June 2021)

Furthermore, Interviewee #14 (2021) suggested that convincing citizens to participate in the blockchain pilot was a challenge which may also slow the adoption:

One of the biggest challenges again for a blockchain project, in general, is adoption, getting people to use it, many people understand Bitcoin, there are certain areas we are working on the pilot, this involves door-to-door surveys and getting the data, getting the data in real time, getting adoption, explaining to people why they should be part of it, trying to get their consent, so it takes quite a lot of engagement and, of course, the government is very slow if you are trying to get more direct integration with the government.

(Interviewee #14, Zoom Interview, June 2021)

However, Interviewee #14 (2021) indicated that they are now getting the endorsements from the CoCT municipality and the key thing is to get buy-in from the users:

We are now getting some of the endorsements from the City of Cape Town in certain aspects. Part of the obstacles or challenges is really to get user buy-in, getting people to give you the data and be able to upload the documents and trust the centres.

(Interviewee #14, Zoom Interview, June 2021)

Globally, countries also remain reluctant to formally adopt blockchain despite successful implementation of blockchain land registry pilots. Interviewee #14 (2021) pointed to the fact that the role and the relevance of the Deeds Office and the role and the relevance of the conveyancers becomes questionable and the affected government officials seems to be reluctant as a result:

America has a pretty solid digital land-buying process, but in fact the Deeds Office is completely on paper, even though these companies set things up, the government really never came on board, hoping that the government, in the long term, will decide because this is already operating. The question would be what the role of the Deeds Office will be; another question will be what will be the role of the conveyancer.

(Interviewee #14, Zoom Interview, June 2021)

However, there seems to be an interest from other key stakeholders to see the digitisation of the land registry in general and key financial services stakeholders such as banks would support the adoption of innovative technologies such as blockchain for the land registry if it is secure and brings more efficiencies. Interviewee #10 (2021) suggested that banks will support smart contracts and a digital land registry in general, provided that there are controls to prevent fraud with smart contracts:

As a principle, the more you can simplify the better, what you have to make sure is that it's not open to fraud. I can't really answer objectively until I fully understand what are the safeguards into it that prevents fraud from actually occurring when two people sign that smart contract.

(Interviewee #10, Zoom Interview, December 2021)

Interviewee #12 (2022) also argued that, for a blockchain solution to be adopted, certain legislation and Deeds Office protocols need to be changed and conveyancers need to use the system:

If you were to change some of the Deeds Office protocols and some of the legislation you could have a fully digital lodgement process. You have to get the conveyancers to use the system and the conveyancers will be happy to use the system, currently it is not trivial, but it could be done.

(Interviewee #12, Zoom Interview, March 2022)

Interviewee #10 (2021) further argued that this is a big task that cannot be done all in one go and needs to pilot first and for the implementation be carried out in a phased approach:

First of all, I think it will have to be piloted initially, secondly it has to be done on a progressive basis. You can't suddenly have a big bang of all the records sitting in the Deeds Registry, whether it is through new platforms they can use to try and achieve that, like blockchain, otherwise I will be happy, provided that security is there.

(Interviewee #10, Zoom Interview, December 2021)

6.10 Public-Private Interplays for Effective Governance

Globally and here in South Africa, pilots have proven that there is an appetite to integrate blockchain technology into the land registry systems through PPIs. Pilots around blockchain

land registries have also been conducted to assess the feasibility of blockchain in terms of how it can address some of the current land registry challenges and limitations. In South Africa, one of the objectives of the pilots was to establish if blockchain can address the current title deeds backlog and introduce a cost-effective and accessible system for beneficiaries of the government-subsidised and affordable housing markets, without incurring the costs of the conveyancers. This motivated the coalition behind the Makhaza pilot to come together and collaborate around this challenge:

Is there a way in which we can help deal with the mess of all of these different documents that is cheaper than what a conveyancer does and that it is closely connected to people? And we were curious about the blockchain, we heard about blockchain activities happening, for example, in Georgia.

(Interviewee #13, Zoom Interview, August 2021)

Through PPIs, the project was funded by the Mastercard Foundation, which is a demonstration that PPIs can work by encouraging government to adopt an innovative technology like blockchain using a pilot:

So, we approached the Mastercard Foundation, and we said that the mess that is part of the transaction process is something that could be addressed by technology. So, could we try, and they had a grant at that time that they were offering to people who wanted to try a technological response to common problems. We put a proposal to then say we would like to pilot the development of a blockchain registry of some sort.

(Interviewee #13, Zoom Interview, August 2021)

It is evident from the pilots that PPIs can enable collaboration between government, communities, and private sector organisations, with the right sponsorship to make provision for the necessary financial, human, technological and infrastructural resources needed to

implement a technology innovation such as blockchain and test its feasibility through a proof of concept. Although blockchain currently has not been fully adopted and integrated with the land registry systems globally or here in South Africa, the pilots have laid down the groundwork and a framework with proof of concepts on what blockchain could be able to achieve. Through PPIs, government and interested parties can help accelerate the development of an integrated, decentralised, blockchain land registry public good.

In South Africa, there are already PPIs between the Deeds Office and third-party commercial service providers. Interviewee #20 (2022), from third-party commercial service provider Lightstone, indicated that they have a relationship with the Deeds Office in the sense that they purchase data from the Deeds Office. This is a confirmation that PPIs already exist:

We are a client of the Deeds Office in a sense that we consume the data, essentially as consumers of their data, we have a relationship with them. I do have regular conversations with the Deeds Office. They are sensitive around engagements with private entities, which I understand they need to avoid the perception of corruption or perception of favouring any particular party. We are willing to have a deeper relationship but at this stage it is not like that. We consume the data, and we pay for the data, and we ask them to correct records when we find that they are incorrect, and we ask them to repair files when they are not working.

(Interviewee #20, Zoom Interview, November 2022)

Moreover, Interviewee #20 (2022) indicated that they were working towards formalising a relationship with the Deeds Office because of the required compliance with POPIA:

Before POPIA came into effect, the Deeds Office engaged with anybody who wanted to purchase their data without the need for a contract. The advent of POPIA got them to relook at that process in light of the new privacy act to put in a contract that governs

the transactions of that data. I believe that all the parties that purchase the data with them have secured and agreed a contract with them. I do not know if that process has been completed with all the parties that purchase their data. The instigation was around compliance with POPIA, but the contract contains more than a simple agreement to comply with POPIA.

(Interviewee #20, Zoom Interview, November 2022)

Now that the Deeds Office is compelled to have contracts with its third-party commercial services provider due to compliance with POPIA, a critical review of the new agreements needs to be assessed to see if they are still within the PPIs framework, rather than the more rigid PP framework as described in Chapter 3.

6.11 Policies and Regulations to enable Decentralisation and the Adoption of the Blockchain Technology Innovation

6.11.1 Deeds Office Mandate

The Deeds Office also suggested that legislation needs to be changed to allow them to set up an internal conveyancing unit to serve customers who cannot afford attorneys' fees:

Another element of our transformation, we are trying to do, on certain transactions, remove the services of a conveyancer and establish in-house conveyancing unit where those indigent people who meet a certain criterion will be assisted inside by this conveyancing unit. Hopefully that legislation will pass, and conveyancers will not challenge it. If it passes certain people who are meeting a certain threshold will be assisted internally in terms of the conveyancing unit. The fact that not everyone is able to afford the services of lawyers, we have dealt with some cases where people transfer property informally. The challenge with that arrangement is that the Deeds Office records still reflect me as the owner, even though informally we went to the police

station, and we transfer on affidavit that does not change the ownership. So, we can point that out to a lack of access due to financial constraints of our people.

(Interviewee #7, Zoom Interview, August 2021)

6.11.2 Data Migration and Title Deeds Backlog

To move fully to a digital land registry environment, the current issues around the title deed backlog for government-subsidised properties also needs to be resolved and data migration of the existing title deeds need to be conducted. Interviewee #13 (2021) recommended that there should be some sort of dispute resolution first and that it cannot be left in the hands of municipal councillors:

These are sorts of questions out there, what we don't want, what is happening right now in the cities, I think it is really scary that the government passes out subsidy approvals, they build houses, people move into those houses, they have transfer title deeds, 10 years later, they go ask for a local councillor, can you verify that this person has been living here, and that local councillor is not a disinterested party. I mean they are under oath, but can they do that accurately, are they applying their minds actually to what has happened. One of the situations where the subsidy was awarded to a husband and wife, and in South Africa what we do to a couple when they get divorced before the title deed past over, and then who gets rights to that property, the right should actually go to the two of them, but the title only goes to one of them and the councillor says that's fine, which it's not. So, I am quite worried about the casual nature of the property transaction at the very bottom because of the presumption that they are not valuable.

(Interviewee #13, Zoom Interview, August 2021)

Data migration could also create new governance issues due to existing property and land ownership data.

6.11.3 Adoption of Digital Signatures and Smart Contracts

The current policies and regulations aimed at encouraging the Deeds Office to move from paper-based systems to a digital land registry include the EDRSA. However, the Act also highlights exclusions as recommended by ECTA, which prohibits electronic signatures for immovable properties. There is also an understanding in terms of what is and is not currently possible in an electronic environment, as Interviewee #3 (2021) explains below:

The way transfers of properties work in South Africa is that, sale of land is regulated by the Alienation of Land Act 68 of 1981, and in terms of the Alienation of the Land, one of the things that the Act determines is that, when it comes to the sale of an immovable property, it must be registered through writing. At the moment, the documents that get lodged by the Deeds Office are physically signed by the clients and there is no provision in our role at the moment for electronic signatures.
(Interviewee #3, Zoom Interview, June 2021)

Furthermore, Interviewee #3 (2021) indicated that, in terms of the electronic signatures for immovable properties, this aspect has not been enacted yet in the EDRSA:

It was published in October 2019, and it has not come to effect yet because clearly, as conveyancers and as attorneys, a lot will have to change for us in order to process transactions electronically. So, that part has not been enacted yet, but what has already come into effect is Chapter 2, and Chapter 2 specifically deals with the Deeds Office becoming electronic, so the Registrar of Deeds has now been instructed in terms of Chapter 2 of this Act to start building processes and managing the process of making

the Deeds Offices electronic, the process within the Deeds Office.

(Interviewee #3, Zoom Interview, June 2021)

However, Interviewee #14 (2021) argued that South Africa has good policies and regulations already in place to support the digitisation of the land registry:

In South Africa, there are some good regulations for this kind of implementation in a sense that, you can use digital copies of your IDs, different copies of different documents for different legal reasons, not all of them, but there is an aspect that digital documents now are being verified. So that we can do real time with API platform, integration with Home Affairs to verify people IDs so that we have more security.

(Interviewee #14, Zoom Interview, June 2021)

Although currently there are laws that prohibit electronic signatures for immovable properties, there is a sign that this could change, and electronic signatures are set to become the standard, according to Interviewee #3 (2021):

I mean if you look at the banks at the moment, some of the banks have already implemented, so all of the banks have implemented electronic systems to different degrees, but they are all now electronic in some form or another. Some of the banks already allow the signing of the bond documents and it is done electronically on the computer. So, those are the recent changes within the banking world when it comes to bonding immovable property and it is a sure sign of where we are going to and what we are working towards in achieving a system that is electronic across the board.

(Interviewee #3, Zoom Interview, June 2021)

Another area of consideration is amending some of the current policies and regulations to enable a shift from paper-based contracts to electronic contracts through blockchain smart contracts. Interviewee #7 (2021) argued that there must be an agreement or approval by other

key stakeholders such as the banks to say electronic or smart contracts provide sufficient security for an immovable property before they can be adopted, or the current system can be phased out:

Moving to what we call a smart contract, we need a buy-in from financial institutions, where financial institutions are saying, Deeds Office, we trust the system, we don't need those volumes of deeds transfer, we need a one-pager, for example. Those financial institutions must come on board, and everyone, and say we accept a one-pager as a true reflection of the property ownership. If those people are saying no, there is a risk that we are going to lose our money or that we are going to lose our investment, so we prefer the current system.

(Interviewee #7, Zoom Interview, August 2021)

Interviewee #20 (2022) expressed caution and argued that, before adopting digital signatures for immovable property which is a major financial decisions, there has to be substantial trust and security:

The decision of buying a house is most often the biggest financial decision that any human would make, if there is any way that is having a digital signature instead of physical signature and can make people less confident about that financial decision or make the decision itself more open to fraud and corruption then this not the right time for it. With smaller things like signing up with Vodacom for a 24-month contract, it is not life-changing consequences if something goes wrong with that. In this case, it can destroy your financial wealth for your entire life if something goes wrong and I think the trust in it needs to be more substantial and secure and the execution of it needs to be fully robust and dispensable before something like that can be introduced. I can't say it is robust and fully dispensable, I am just saying, because of the size of the asset transfer and the financial decision, it needs to be more robust and there are lot of other

places in which digital signatures are being used.

(Interviewee #20, Zoom Interview, November 2022)

Following the argument made Interviewee #20 (2022), consensus will need to be reached among key stakeholders within the land and real estate sector, including citizens (buyers and sellers), that electronic signatures for immovable properties are now accepted. Key legislation like the ECTA and the EDRSA could be amended to pave a way for advanced electronic signatures to be accepted for immovable properties. This is important to enable the implementation of the blockchain-based land registry, which could automate the current paper-based agreements by making use of smart contracts with advanced electronic signatures. The government, through legislation, could compel both public and private institutions to adopt electronic signatures within the land and real estate sector as part of new institutional arrangements.

6.12 Conclusion

The findings show that corruption and fraud is, broadly speaking, not severe within the land and real estate sector in South Africa. However low-value properties, especially properties within townships, communal land and informal settlements, are more vulnerable to corrupt or fraudulent activities. The land registry is currently not accessible by most citizens; automation through a technology like blockchain could bring more efficiencies that can fast track the implementation of land reform and assist in dealing with corruption and fraud. Finally, blockchain pilots for the land registry has been successful but there is little evidence of adoption by government.

Corruption and fraud is broadly speaking, not severe within the land and real estate sector in South Africa. However low value properties, especially properties within the townships, communal land and informal settlements are more vulnerable towards corrupt or fraudulent activities.

Drawing from the Conceptual Framework in Chapter 03, increased accessibility to the Land Registry public good could result in effective governance by making the Land Registry more inclusive and become accessible by all citizens including government subsidised property owners, property and land owners within the communal land. Blockchain technology innovation could enhance Land Registry governance by strengthening security and reliability that will help reduce some of the fraud elements.

Decentralisation could reconfigure the current institutional arrangements and allow more institutions to administer and co-manage the Land Registry together with the Deeds Office through public-private interplays. Digital transformation enabled by blockchain technology within the Deeds Office and the Land Registry could automate the current manual and paper-based processes and drive the costs of buying and selling property and land in South Africa

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

Drawing on the findings from the document analysis and evidence from the interviews, as well as analysis in previous chapters (Chapter 5 and 6), this chapter concludes with policy and regulatory recommendations.

7.1 Observation on the Research Findings

This thesis concludes that realising effective governance by implementing a decentralised blockchain land registry is not a solution on its own and is likewise not a silver bullet for all the current land reform governance inefficiencies, especially around corruption and fraud. However, from the interview evidence, literature review, and the blockchain pilots outcomes, this thesis concludes that an enhanced land registry could fulfil its role as a public good and improve governance through decentralisation enabled by blockchain. For example, other key role players, through various PPIS, can provide the necessary human and financial resources to ensure the effective day-to-day administration of the land registry. This would provide tamper-proof historical data and information to verify transactions, which could be used for better property and land management and as evidence during investigations.

The empirical findings show that a blockchain-based land registry cannot prevent or stop corruption and fraud from happening, since most of the principal-agent and collective action problems happen outside the land registry.

This thesis concludes that the property market segments most affected by governance issues such as title deed backlogs, unavailable and unreliable records, and corruption and fraud in South Africa are the low-value property market segments. These market segments include the subsidised and affordable housing, properties that reside within communal land, and properties within informal settlements.

This thesis has demonstrated that an inclusive, complete, secured, decentralised land registry can limit some of the corruption and fraud issues, especially in relation to the government's land reform initiatives such as subsidised and affordable housing where the problems are most pervasive.

This thesis also demonstrated that blockchain can contribute to effective governance by enhancing the public good characteristics of non-rivalry and non-excludability, accessibility, auditability, security, reliability, transparency, and accountability.

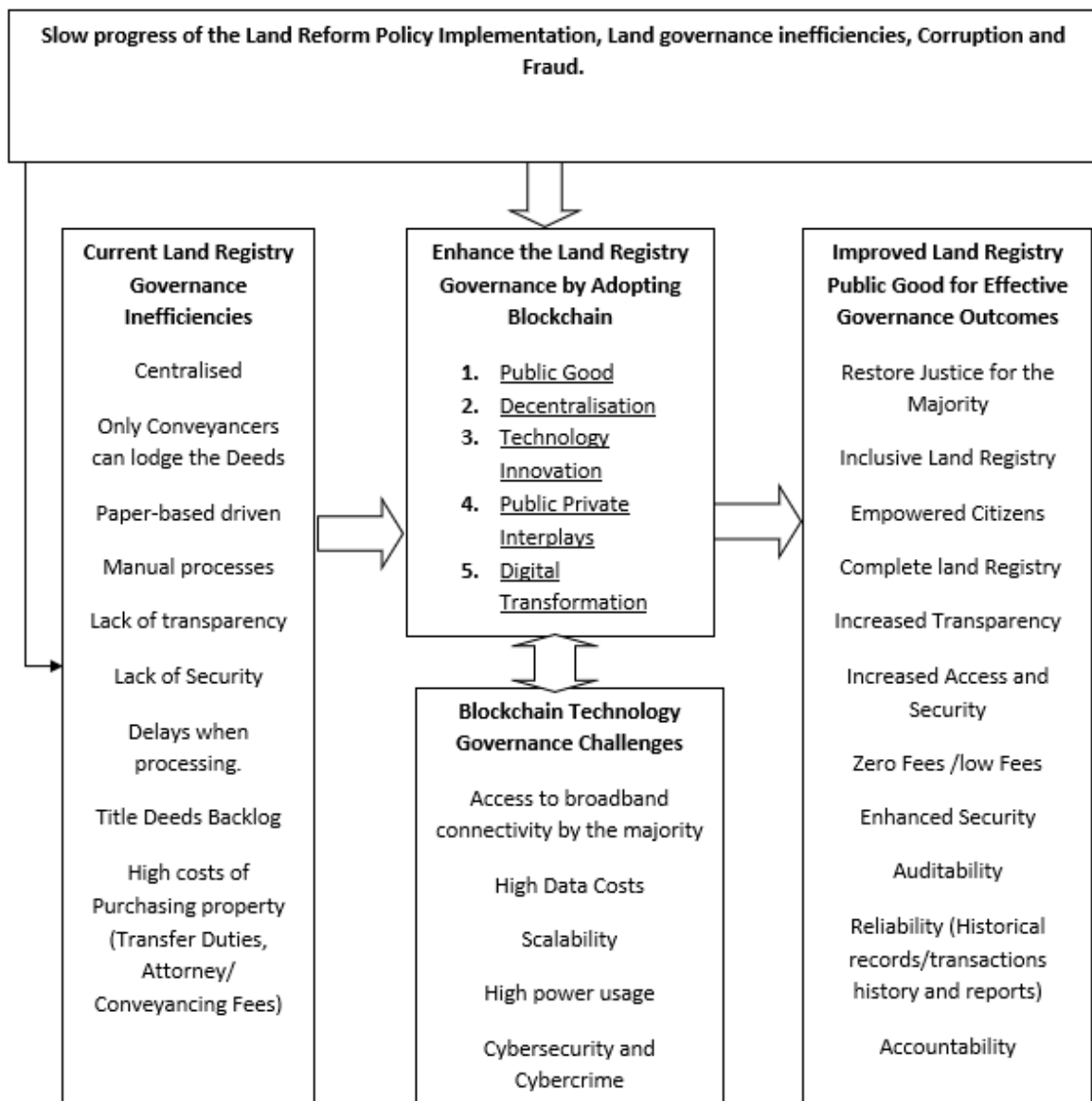


Figure 7-1 Research Findings Analysis Context Diagram (Source: Author's own compilation)

A decentralised land registry that is inclusive, complete, and secure can support land tenure security and secure the land rights of the land reform beneficiaries most affected by title deed

backlogs, high fees, corruption and fraud. Figure 7-1 highlights the flow of the research findings from identifying current key land registry governance inefficiencies and shows how blockchain can be adopted to address inefficiencies and achieve the desired outcome which is an enhanced land registry public good.

An inclusive decentralised blockchain land registry can support land reform title deed registrations and security of tenure for low-value properties, which will strengthen property and land restitution. This will ensure that many of the citizens who own low-value properties have access to the land registry and the government can effectively and efficiently monitor and manage land reform.

Despite the digitisation of the land registry, there are other land governance processes, checks and balances that still need to be done outside the blockchain land registry to support land reform and to assist in dealing with corruption and fraud. This includes monitoring and identifying the current occupants of subsidised houses without title deeds and verifying if the current occupants are rightful or legitimate owners.

Evidence indicates that the current land administration institutional processes in South Africa remain fragmented and are not currently integrated with the national land registry system or the current Deeds Office DRS. This includes the HSS of the DHS, which is used for the management of subsidised and affordable housing and which is currently not integrated with the land registry and contributing to poor management of land reform housing programmes.

This thesis also demonstrated that a decentralised blockchain land registry, with automated purchase agreements through smart contracts, could enhance property management, empower land and property owners and reduce a variety of costs.

This thesis concludes that reducing the costs will also reduce principal-agent problems between principals such as buyers and sellers and agents such as estate agents, conveyancers and public officials because there will be less motivation to pay bribes.

Evidence from the blockchain pilots that were conducted in South Africa demonstrates that blockchain can indeed automate the conveyancing process and be used as a secured deed transfer document storage, which can also be integrated into the land registry and reduce dependency and reliance on estate agents and conveyancers.

Only digitising or automating land registry processes within the Deeds Office will not be sufficient to remove all the current inefficiencies due to paper-based and manual processes that often enable corruption and fraud unless other key institutions or stakeholders are also going online.

The empirical findings show that the new institutional arrangements and reforms of an integrated, decentralised blockchain land registry system, with all key role players participating either from the administration perspective or simply just monitoring or playing a watchdog role, will increase transparency, accessibility and accountability, which will enhance land registry governance.

It is also conceded that an integrated blockchain land registry cannot prevent corruption which requires sanctions or incentives to adjust human behaviour. The land registry as a system or solution will be able to solve many of the fraud issues because of its ability to verify documents.

With the exception of SARS, which has already gone online, the success of an electronic or automated land registry is also dependent on other key role players or political institutions such as the DHA, DTIC, CPIC, DoJ&CD, MHC, DEL and various municipalities also having online systems in place that can be integrated with the land registry.

Data and information from the decentralised blockchain land registry will be secured and reliable, and therefore can be used as a source of evidence to assist law enforcement agencies investigating corruption and fraud cases and also to assist institutions to better manage property and land reform.

PPIs between the state and private sector organisations are not going to be something new, because there are already interplays in place between the Deeds Office and other key political institutions and private sector players such as real estate organisations, conveyancers and notaries, banks and third-party land registry data and information commercial service providers.

This thesis demonstrated that, although third-party commercial service providers only provide stakeholders with the interfaces to search and access information from the current DRS, the current PPIs with third-party commercial service providers is evidence of the fact that the land registry can indeed be decentralised to empower citizens to take charge of some of the tasks and actions around the property purchasing processes, to increase access and transparency to the land registry as a public good and to ultimately decrease the costs of purchasing land and property in South Africa.

The insights and lessons from the blockchain pilots suggest that, through PPIs, relevant blockchain technology infrastructure, skills and expertise and other resources required to drive effective land governance digital transformation can be put in place to deliver the decentralised blockchain land registry as a public good.

The blockchain pilots analysed in this thesis demonstrated that blockchain can provide robust data management capabilities with no single point of failure by virtue of its decentralised nature. This will enhance the security and reliability of the land registry as a public good such that, for example, third-party commercial service providers can maintain real-time copies of the Deeds Office database, limiting the effect of systems being offline.

Due to advanced and robust information security capabilities such as advanced electronic signatures that have secured many ecommerce and digital platforms including highly sensitive digital banking platforms, cybercrime and cybersecurity risks and threats cannot delay and should not be the bottleneck towards the adoption of the digital land registry in South Africa or prevent the land registry and other key land governance systems becoming fully digitised into a complete electronic or digital online system. This is because other key, mission-critical services with greater cybercrime and cybersecurity risks, such as the traditional banking services, are already being rendered electronically.

Citizens and investors already have trust in online systems such as digital banking. As a result, this thesis concludes that citizens will also trust the digital decentralised blockchain land registry, provided there are security measures in place such as advanced electronic signatures for immovable properties. This will also enable the land registry to become the backbone for the digital economy, with secured digital property rights in the form of electronic title deeds for all property and landowners in South Africa.

What is clear from the analysis is that a suitable blockchain land registry deployment model could ensure that there is sufficient control and checks and balances in line with the Deeds Office's requirements and other key institutional reforms such as mandates, policies, procedures, and processes.

The outcome of the blockchain pilots demonstrated that further decentralisation of the Deeds Office using blockchain is possible and can support and enable the Deeds Office to set up internal conveyancing units and additional satellite offices to service remote areas.

Decentralisation will also empower local municipalities to execute some of the conveyancing processes required to process transfers for low-value properties, as they have close proximity

with the most vulnerable beneficiaries of land reform. Decentralisation would also localise the process of registration and keep the land registry centrally coordinated via the Deeds Office.

Through decentralisation the Deeds Office can also invite private players such as the current third-party land registry commercial service providers to develop interfaces that automate the property purchasing processes, including purchase agreements using blockchain smart contracts, to further increase the transparency and accessibility of the land registry.

Decentralisation could empower other institutions such as the PPRA to monitor and regulate the profession of estate agents. Furthermore, the LPC will also be empowered to monitor and regulate the profession of conveyancers. Both the PPRA and LPC can receive a list of their members involved in land and property transactions on a weekly and monthly basis.

Other key private sector role players with a vested interest in the land registry such as banks could also form part of the decentralised land registry administration network, with their own internal conveyancing departments, through PPIs.

Despite the little research done around the blockchain pilots in various countries, Racetin et al. (2022) found that there are some positive examples of successful implementation of blockchain technology in a small but relevant number of countries such as Estonia and Georgia. These findings are based on the pilots that these countries have conducted, and the full rollout and adoption of blockchain solutions are yet to be realised. The pilots have, however, demonstrated how government can drive innovation using pilots as prototypes or proof of concepts and to test PPIs, as highlighted by the conceptual framework that can drive innovation and digital transformation within the Deeds Office. While blockchain technology for the land registry use case has not been fully tested in South Africa, initial pilots have had positive, if limited, results. More experimentation, particularly with regards to how various PPIs could meet current institutional capacity and resource constraints are required.

Below are the conclusions explicitly aligned with this thesis's main research question and thesis key sub-research questions:

7.1.1 Blockchain Technology Impact on Land Registry Governance

Blockchain will positively impact and enhance the land registry public good and increase accessibility, auditability, security, reliability, transparency, and accountability, which will enable the government to monitor and manage land reform programmes effectively with greater tenure security through digital title deeds.

7.1.2 Blockchain to Increase Efficiencies to Limit Opportunities for Corruption and Fraud

Blockchain will not stop or prevent corruption and fraud. However, blockchain will increase efficiency in land governance by enhancing transparency, accessibility, auditability, security, reliability, and accountability for the land registry. This will fast track the implementation of land reform, especially title deeds registration and provide low-value properties with security of tenure.

With an enhanced, inclusive and complete land registry, all citizens will have a digital title deed and more cases of fraud will be detected because of the availability of secured records. Blockchain will supply the necessary tamper-proof evidence to strengthen property and land restitution and to support the investigations of the relevant corruption and fraud cases around land reform.

7.1.3 Corruption and Fraud within Land and Real Estate Sector

Evidence suggests that low-value properties are most affected by corruption and fraud in South Africa. Corruption and fraud within the land and real estate sector are enabled by socio-

economic issues such as inequality, poverty, unemployment, illiteracy, and lack of consumer education for the poor.

Land governance inefficiencies such as lack of systems, lack of records, and manual and paper-based systems enable corruption and fraud. Key role players such as traditional leaders and councillors take advantage of the beneficiaries of the government's land reform programmes and there is currently no evidence or audit trail that can assist with investigations or audit processes.

7.1.4 Land Reform Beneficiaries Awareness and Training

Housing reforms such as RDP are more susceptible to corruption and fraud due to other governance inefficiencies, as highlighted in previous chapters, and due to the beneficiaries' illiteracy and ignorance. Some beneficiaries tend to take them for granted and easily fall for fraudulent activities such as selling subsidised houses to undocumented foreign citizens at low value.

The state must introduce an initiative to raise awareness about land reform, especially within the townships, rural or remote areas and informal settlements. Awareness campaigns must put an emphasis on the land reform programme's objectives, policies, and regulations so that the subsidised houses and land (both residential and agricultural) are less likely to be sold informally and without following due process. This will compel the sale of allocated subsidised houses or land only through formal processes, wherein titled deeds are eventually registered in the land registry and issued to the new owners in line with the land reform policies and regulations.

The awareness initiative must also educate beneficiaries of the value of subsidised houses. The state must set a minimum value of transfer or resale value for subsidised houses which must be reviewed on an annual basis.

7.1.5 Efficient and Effective Monitoring and Management of Land Reform Programmes

To keep beneficiaries in check, the state must enforce beneficiaries' accountability and introduce an annual audit as part of the land reform programme to verify and confirm the occupants of the subsidised houses against immutable ownership information captured on the blockchain land registry, which will assist in dealing with corruption and fraud.

Law enforcement agencies such as SAPS should use the blockchain land registry's immutable records and partner with municipal housing departments in order for those found to be illegally occupying government-subsidised houses or state land to be held to account.

7.1.6 Policies and regulatory reforms for an inclusive, complete, transparent, accessible, auditable, secured, reliable, decentralised Land Registry

The DRA needs to be reviewed and updated so that the mandate of the land registry allows other key role players with interests in the administration of the land registry to participate.

The EDRSA also needs to be reviewed to explicitly allow for the use of advanced electronic signatures and electronic or smart contracts for immovable properties so that the Deeds Office can adopt blockchain technology for the land registry.

7.1.7 Obstacles and Technical Concerns/Constraints

From the literature review and the interview evidence, this research concludes that, although blockchain has the potential to increase accessibility, transparency, auditability, security, reliability and to enable and support decentralisation, it is still faced with challenges around scalability and heavy power consumption that need to be improved, especially if the blockchain land registry were to be configured as a public blockchain and not as a private, permissioned blockchain.

7.1.8 Blockchain influence on Property Management Regime

The signing of property and land purchases using electronic signatures will improve overall property management governance and will also enable the government and other key private institutions to adopt blockchain systems with advanced functionality, such as smart contracts that can be signed electronically. This will result in the digitalisation and digitisation of buying, selling and conveyancing processes through blockchain.

7.1.9 Foundational conditions, such as infrastructure, human development, and digital skills development

A decentralised blockchain land registry requires high-speed, reliable and ubiquitous broadband infrastructure, especially in remote or underserved areas where many citizens are currently not served by the Deeds Office and do not have access to the land registry.

End users such as municipal officials and not-for-profit organisations involved in low-value properties must be trained on how to process transfers on the new, digital, blockchain-based land registry.

With the special land registry access point overseen by trained municipal officials, end-user training for citizens and communities at large will also be required. The end-user training will also raise awareness around cybersecurity and cybercrime threats so that the blockchain land registry does not exacerbate or create new opportunities for corruption and fraud.

7.2 Recommendations

To secure the integrity of records, evidence suggests that blockchain can be implemented as an integrated records management system to secure the land registry. Overall, this thesis recommends an inclusive, complete, secured, integrated and decentralised blockchain-based

land registry public good to enhance property and land restitution and to support government land reform as part of the EDRSA implementation.

7.2.1 Institutional Reforms to Address the Current Land Governance Inefficiencies and Support Land Reform

Despite decentralisation of the land registry, which will deal with most of the current land governance inefficiencies, it is recommended that the Deeds Office, together with other relevant state departments, must continue to regulate the land and real estate sector and land reform programmes, and be the custodians of the policies and regulations around the land registry.

Furthermore, the Deeds Office must share the responsibility of the management and administration of the land registry with other key role players with keen interest in and influence on the land registry processes for better and improved governance, increased transparency, and accountability.

Municipalities should be capacitated to assist ordinary citizens with buying, selling and conveyancing processes and to do away with estate agents and conveyancers in markets wherein the majority are faced with poverty and unemployment. Moreover, to resolve the issue of land registry accessibility and conveyancing costs payable during transfers of low-value properties, this thesis also recommends that the Deeds Office, working with municipalities, needs to set up a public conveyancing unit to be tasked with running deed transfers of properties for government's land reform housing programmes such as subsidised and affordable housing, properties within communal land and properties within informal settlements, in order to secure their tenure security.

This study's findings and evidence suggest that cash transactions and low-value properties are most affected by corruption and fraud, and additional anti-corruption and fraud controls can be

introduced for low-value properties and cash-driven transactions with the more stringent and rigorous vetting processes currently only applied to high-value properties.

All property transfers, not just bonded transactions, including transfers for subsidised houses, affordable houses and properties within communal land need to go through the FICA vetting process to verify both buyers and sellers. This will help deal with the current land reform governance inefficiencies.

Blockchain can further automate the FICA vetting processes by integrating the decentralised blockchain land registry with other key institutional systems such as the DHA to verify identity numbers and marriage statuses, SARS to verify taxes paid or tax compliance statuses and the CIPC for verifying company existence or registration.

Koehlin, Quan and Mulukutla (2016) recommended that national governments should introduce preventive measures aimed at limiting the discretionary powers of central and local government administrations regarding land transfers and allocations, prioritising completeness and transparency of the cadastre and community participation and accountability. Some of the current land governance inefficiencies are a result of political institutions working in silos. Key political institutions such as the Deeds Office, which falls under the DALRRD, and national, provincial and local DHS branches need to work together and integrate the current HSS with the land registry. This will remove the current duplication of efforts whereby each institution processes the same documentation required for deed transfers.

The Deeds Office, as a central authority and the custodian of the land registry, should be given the power to integrate the HSS into the land registry and automate the other manual and paper-based land governance processes such as the compilation of the land reform beneficiaries' waiting list and the beneficiary allocation processes.

An integrated, decentralised blockchain land registry will enable other political institutions to have access to the same copy of the database with immutable records in a transparent manner. This will allow each political institution to make relevant land governance decisions based on their political mandates and with their actions being recorded on blockchain, which will result in an audit trail for everyone to see including law enforcement agencies and other interested parties.

Provided that there is enough broadband coverage, current blockchain constraints such as scalability have been resolved and there is sufficient digital literacy among the rest of the population, government should consider adopting blockchain so that, in the long term, users such as buyers, sellers, subsidised and affordable housing beneficiaries, citizens that live on communal land and within informal settlements, and other communities at large are empowered to use the system directly and upload all the necessary or required documentation as part of the whole buying and selling process.

If buyers and sellers are empowered, the conveyancing process will become more transparent, effective, and efficient. This will also drive down the current costs of estate agencies, conveyancers and bond transfer attorneys.

Currently, property buyers and sellers are faced with high property purchasing and selling costs, mainly contributed to by costs such as estate agent commissions, bond transfers and cancellation fees, conveyancer fees and unavoidable costs such as tax.

The government can consider new institutional arrangements by decentralising the management and administration of the land registry itself so that it can be distributed to allow other key role players to also process property purchases, execute the conveyancing process and to perform the collection of relevant data required for the lodgement of the deeds with the Deeds Office to ensure effective governance and enhance transparency.

For example, other private sector players such as banks must be allowed to set up their own internal conveyancing units or departments and administer their own transactions on the decentralised blockchain land registry through PPIs.

To reduce some of the costs and to force players such as estate agencies, banks and conveyancers to reduce their costs, the current PPIs with third-party service providers could be expanded to allow third parties to build interfaces and land governance process engines that automate the buying, selling and conveyancing processes to empower advanced property owners who wish to transact without relying on estate agents and conveyancers.

Third-party commercial service providers have resources and capacity and are well-positioned to further drive innovation and create value-added services based on the decentralised blockchain land registry, which can result in the land and real estate sector market's liberalisation to empower buyers and sellers.

Government should consider regulating estate agency fees, bond registration fees and bond cancellation costs so that they are within reasonable thresholds for the low- and middle-income land and real estate market segments.

It is recommended that government consider zero-rated bond registration and bond cancellations costs for land and properties such as subsidised houses, affordable houses, properties on communal land and properties in informal settlements. This will stimulate and help formalise the resale or secondary market of these properties. This will also make land reform more sustainable and reduce elements of corruption and fraud wherein citizens trade informally using affidavits to avoid costs associated with formal transfers.

Beneficiaries should be selected through open processes, and they should receive secure tenure rights that are publicly recorded. The state should endeavour to prevent corruption in redistributive reform programmes, particularly through greater transparency and participation

(FAO, 2012). In the case of subsidised and affordable housing, Deeds Office officials, developers and administrators, working together with municipal housing departments, municipal councillors and DHS, must also process the beneficiaries' waiting list and upload all transfer documents for all beneficiaries from time-to-time on the new integrated, decentralised blockchain land registry to avoid duplication of effort in other systems such as the HSS.

Beneficiary allocations can be transparently and immutably done on blockchain without waiting for the actual allocation of the houses or issuing of title deeds, until such time as houses have been built and are ready for occupation. This will ensure that each beneficiary on the waiting list and the associated application has a tamper-proof record on the blockchain which is immutable and cannot be manipulated or changed even if others have paid bribes or kickbacks to councillors and traditional leaders.

One of the benefits of PPIs is flexibility, as opposed to more rigid PPS, which can allow more and more role players in the private sector, including not-for-profit organisations, to participate in the decentralised blockchain land registry and assist the state to fast track the implementation of the land reform programme.

For example, Transaction Support (as established by CAHF for the blockchain pilot in Makhaza) can be adopted nationally as a PPI model to resolve land reform issues such as the title deeds backlog for subsidised houses. This PPI model can be expanded and adopted as a national initiative so that Transaction Support centres can be set up within townships and rural areas to work with the Deeds Office and various municipalities to fast track the implementation of land reform in South Africa.

The existing PPIs, where there are no contractual obligations between government and stakeholders, such as subsidised housing administrators, estate agencies, conveyancers and property developers, around subsidised and affordable housing should be supported by a

reliable, secured, and transparent system. The system should automate all the subsidised housing processes from the beneficiary application and allocation processes, until the actual issuing of the title deeds. This will enable the Deeds Office to not rely on Microsoft Excel spreadsheets, which can be easily manipulated when passed amongst stakeholders.

Furthermore, for the land registry to fully support the land reform programme as a public good, it needs to record the beneficiaries of land reform programmes from the point of application, before allocations can be made or actual deeds transfers can be enacted. This would allow for a fraudulent land reform transaction to be identified and investigated using the blockchain tamper-proof audit trail.

Blockchain can support the land reform housing programmes if these processes can also be automated on the current HSS, which should be integrated with the land registry. If both systems will continue to coexist, government must decide which system will store the collected beneficiaries' supporting transfer documents to avoid duplication of effort and the risks of having two different data and information repositories.

It will take time for individuals to fully understand and accept the principles of decentralisation, and the process can create cognitive dissonance for those accustomed to trust-based services (Antonopoulos, 2014). As earlier contended, when it comes to decentralisation, blockchain is the answer and there is no other relevant, scalable technology better suited for this objective.

The Deeds Office is already operating in a distributed environment and as such, for a start, existing commercial third-party organisations such as Lightstone and Windeed could form part of the distributed network of the secure, decentralised blockchain land registry. The distributed network will have access to the same copy of the Deeds Office land registry database and be able to provide their data and information services in real time.

A hybrid solution that mixes smart contract use with existing technology infrastructure, enabling preservation of the role of a land registry agency as the ultimate arbiter of valid claims is proposed (Bennett, Miller, Pickering and Kara, 2020). Furthermore, Alam, Rahman, Tasnim and Akther (2020) also argued that considering the technological knowledge and capacity of the people and the government, a phase-by-phase blockchain adoption model that starts with a public blockchain ledger and later gradually incorporates two levels of hybrid blockchain is relevant.

Given the evidence, the hybrid blockchain deployment with both public and private blockchain features is a more viable model and recommended to address issues of transparency, accessibility, auditability, security, reliability, and accountability to bolster governance. Within the hybrid process, the private, permissioned blockchain, which only allows selected key stakeholders to perform administrative tasks on the land registry is required.

South Africa is still faced with the problem of the digital divide. Some citizens have no access to broadband and there are also high levels of digital illiteracy among the poor and the elderly. These challenges have an impact on the adoption of the blockchain land registry and its utilisation in a manner that it is fully leveraged for the benefit of the currently marginalised.

Provided that the issues of broadband connectivity and digital illiteracy can be reduced or addressed, the public blockchain component is also needed to facilitate broader access by citizens to the land registry with only initial first level access with basic rights to view and search the land registry. Broader access will allow property owners to monitor the status of transactions, receive relevant notifications from the land registry and to check their ownership information from time-to-time.

The first level of access will need to be a free service so that all property owners can keep track of their transfer and ownership information. The main objective of this level will be to increase

accessibility and transparency by giving every property owner in South Africa access to the land registry. The second level of access will have additional access rights such as updating and deleting, which can be considered to allow buyers and sellers who are able to transact and upload the necessary documents for the lodgement of deeds to not rely on estate agents and conveyancers.

If buyers and sellers are empowered to execute a transaction on their own, new types of fraud may emerge and robust security measures need to be in place in the interfaces built for them. Cybersecurity and cybercrime training and awareness need to be provided by the Deeds Office and third-party commercial service providers.

Furthermore, the hybrid, private, permissioned blockchain must be configured to give permission to key institutional stakeholders such as estate agents, conveyancers, Deeds Office officials, banks, SARS, the DOJ&CD, DHA, DEL, the UIF and the CIPC, depending on their land registry interest, roles, and mandates. In an automated fashion within the decentralised blockchain land registry, key institutional stakeholders must give consent to each transaction in line with their particular focus areas and capabilities before the transaction can be finalised and saved into a tamper-proof blockchain land registry. Evidence suggests that, because land and property are long-term assets and require high commitment levels by buyers, property transfers can only be finalised and saved within the blockchain when all key stakeholders have provided consent through an automated workflow process.

Aside from the automated workflows of buying and selling processes, mechanisms will need to be put in place for some institutions that require certain steps to be authorised in line with their internal authority delegation policies. For example, large institutions such as SARS, banks and municipalities should appoint supervisors and administrators to monitor transactions and give consent in line with their political mandates, powers and interests. From the Deeds Office perspective, officials such as examiners will still need to do their own verifications and give

consent to the overall transaction as part of the deeds lodgement process. Conveyancers can also perform their verifications and give their consent accordingly.

The consensus-based property transfer verification system will provide greater transparency, which may help reduce corruption and fraud with more stakeholders monitoring transactions in addition to the current conveyancing process and Deeds Office deed examination processes. Blockchain can provide a tamper-proof audit trail of who gave consent to which; information which will be useful for investigations of transactions linked to corrupt activities and fraudulent transactions.

The hybrid public blockchain is required to increase accessibility and to allow buyers, sellers, and community-based administrators to initiate transactions themselves instead of relying on the estate agents, developers and conveyancers to drive the end-to-end process on their behalf. For this, the private blockchain needs to be integrated with the public blockchain to facilitate all the necessary back-office processing and verification of data uploaded by the buyers, sellers, and administrators within the decentralised land registry network. Depending on the type of transaction, stakeholders such as estate agents, conveyancers, Deeds Office officials, SARS, bank representatives, CIPC officials and municipal officials can become verifiers on a private blockchain and give consent to the transaction before it can be approved or before the title deed can be issued.

The new integrated decentralised blockchain land registry must also be integrated with the DHA's identity verification and management system to verify the identities of all the parties involved in transaction, and to check the validity of their marriage statuses and marriage contracts, in both-real time and batch processing. For transactions belonging to private companies, the land registry public good must be integrated with the CIPC to conduct verification of a company's registration, in both real-time and batch processing. This thesis

recommends that the land registry also be integrated with SARS for transfer tax verifications, in both real-time and batch processing.

Integration with various municipal systems is also crucial for municipal rates and taxes clearances and verifications, in both real-time and batch processing. Integration with the UIF to verify employment and salary for the affordable housing beneficiaries, in both real-time and batch processing, is also necessary. Lastly, integration with the DoJ&CD must be implemented to verify various court orders that trigger transfers, in both real-time and batch processing.

Without accurate data, the power of a blockchain-based solution for a land registry would be greatly limited, as poor-quality information posted on the blockchain would make third-party verification of land titles difficult (Shang and Price, 2019). This thesis recommends that a complete data migration of existing title deeds to the new blockchain land registry needs to be first conducted before people can place reliance on the new, integrated, decentralised blockchain land registry. In line with the garbage in, garbage out principle, the data and information that goes into the system must be of the highest possible accuracy and quality. If data migration is not handled with care and there are still outstanding deed transfers and title deeds in the new decentralised blockchain land registry, more corruption and fraudulent activities will be enabled by the new system, which will continue to erode the little gains achieved by land reform policy since 1994.

The digital channels and user interfaces for the new land registry should be designed with simplicity in mind to empower buyers and sellers to upload all the necessary transfer documents directly to the platform so that costs of buying or selling a property can be reduced, which will reduce the opportunities for corruption and fraud. Moreover, the new land registry system should remind citizens or property owners to review and check their property ownership data and information annually or if there are any changes. This will compel property owners to check their title deeds and property ownership information on an ongoing basis and request

amendments if there are changes to be made. This can be done annually to reduce opportunities for corruption and fraud. It can also be done online using digital channels or interfaces linked with the decentralised blockchain land registry or can be conducted by Deeds Office officials and administrators within municipalities through revenue collection processes around municipal rates and taxes, water, and sewage. Furthermore, the Deeds Office needs to run a monthly reconciliation process to reconcile Deeds Office ownership records with municipal accounts on an ongoing basis and not only during the sale or purchase of property, in order to keep the land registry updated and assist in detecting fraudulent activities.

Deininger and Goyal (2012) argued that, although it will not alter the quality of underlying property rights information, computerisation can reduce the costs associated with keeping the property register up-to-date, eliminate informal side payments that have traditionally been associated with property registration, and improve third-party access to registry information. It is recommended that the payable fees for third-party service providers need to be reviewed and the government must consider subsidising these services for the low- and middle-income market segments so that the land registry public good can be easily accessible, which may eradicate informal trading and fraudulent activities.

The implementation of a conveyancing system, through blockchain, in which smart contracts are used from initial property valuation through to the registration of the title or deed might have several potential uses (Teruel, 2019). Moreover, the implementation of a blockchain to handle only one of the steps (e.g. only the registration) might mean there is no significant benefit for the real estate conveyancing system in having part of the process in blockchain and other parts outside it (Landlordsguide, no date).

Automation on blockchain should start from the point where both the buyer and seller sign the Offer to Purchase. This can be automated through smart contracts, which will allow buyers and sellers to agree on the offer and prevent estate agents from manipulating purchase prices.

Furthermore, due to the fact that, in South Africa, the Deeds Office does not only register the titles but also registers the deed transfers prepared by the conveyancers by having buyers and sellers signing physically in front of the conveyancers, there are further opportunities to utilise blockchain's smart contracts features and have both the conveyancers and buyers or sellers give consent to say they have physically met and the conveyancer has verified the buyer or seller.

Blockchain can keep an immutable record which can be used to prove in the future which conveyancers facilitated the transaction. This will enhance security and provide reliable evidence around ownership of property in South Africa, which is currently lacking due to manual and paper-based processes that are prone to manipulation and susceptible to human error.

The PPRA should create a database of qualified and active estate agencies that are allowed to engage on land and property transactions so that the database can be integrated with the land registry deeds registration and deed transfer processes, which will help identify which estate agent worked on which transaction. This can also assist with investigations into fraudulent transactions and bogus estate agencies.

Similarly, the LSSA or the LPC should also create a database of qualified and active conveyancers who are allowed to engage on land and property transactions so that the database can be integrated with the land registry deeds registration and the deed transfer processes to verify conveyancers and detect and prevent fraudulent transactions and fraudulent conveyancers.

The new decentralised blockchain land registry can also be extended to independent private land custodians similar to the Ingonyama Trust, independent private organisations, communities managing significant land for mixed use and other large communal lands under

the custodianship of traditional leaders, so that the Deeds Office can train administrators based within those communities to also process deed transfers and title deed registrations.

To avoid corruption and fraud, the Deeds Office and other independent organisations must conduct land audits within those communities against what exists in the land registry first. It must also be easier for the beneficiaries that reside in these communities to lodge complaints, grievances and disputes with the Deeds Office around ownership issues, corruption and fraud. These must also be investigated accordingly.

The government will need to consider making it mandatory for all land and property owners to have a will and testament highlighting their beneficiaries. This can form part of the buying process whereby it is compulsory for a buyer or a beneficiary of a subsidised house to have a will in place, which can also be stored in the blockchain to avoid corruption, fraud and disputes when the owner of the property eventually dies.

Change management is one of the core objectives of digital transformation. There is global consensus on the need for ICTs to support digital transformation in public administration and this is specifically true in decentralised public administration, where the stakeholders need a modern technology that integrates them (Gebrihet and Pillay, 2021). Government and other key institutional stakeholders need to raise consumer awareness and conduct public training about the new, integrated and decentralised land registry system to accelerate adoption. Training and awareness should focus on how blockchain empowers citizens and how it supports land reform, including raising awareness in terms of corruption and fraud risks and threats, cybercrime and cybersecurity risks and threats and potential cost savings on the consumers' part.

Anecdotal evidence from practice suggests full uptake is something that governments, the conventional custodians of these records, will only consider in the context of a more matured technology offering; one that can be shown to fully satisfy cybersecurity considerations and

that has had the commensurate policy, legislative, and regulatory attention of government (Bennett, Miller, Pickering, and Kara, 2021). To accelerate the adoption of innovative technologies such as blockchain for the land registry, discussions around required policies, legislation, and regulations need to include both government and the private sector as key role players.

Discussions should be followed by a PPI setting which must be able to facilitate digital transformation within the land and real estate sector and provide the required resources, expertise and skills that states normally do not have.

As part of the Deeds Office and land registry digital transformation journeys, post the digitisation of the existing paper-based title deeds into electronic title deeds, the government can explore the modernisation of the land registry using blockchain. This can be executed in phases.

In Phase 1, the Deeds Office can introduce a decentralised blockchain as a security layer for more secured records and to eventually replace the current traditional database. Phase 2 can create a distributed network across all the Deeds Offices in the country and the current commercial third parties. Having the same copy of the database does away with a single point of failure and allows Deeds Office notaries and examiners across the country to work on any transactions irrespective of their jurisdictions.

Phase 3 can review and update policies and regulations to permit advanced electronic signatures for immovable properties. The last phase, Phase 4, can allow the Deeds Office, in the long-term, to develop a private, permissioned blockchain land registry by integrating the land registry with various stakeholders' systems, implement new interfaces, automate agreements with smart contracts and expand participation to other public institutions such as municipalities and other key stakeholders to provide consensus on certain transactions based on their mandates.

The Deeds Office digital transformation programme should facilitate the necessary change management by addressing digital literacy challenges within communities through upskilling and reskilling relevant stakeholders.

Racetin et al. (2022) argued that blockchain technology adoption should be treated differently for developed and developing countries and matters of legislation and standardisation should be considered in developed countries. The DRA would need to be amended again, to further decentralise the land registry to allow other key role players with interests and influence on the land registry to manage and administer it through PPIs.

Moreover, the DRA must also be amended to decentralise the conveyancing process and to allow for the conveyancing process to be digitised so that there is no longer dependency on the conveyancers alone and so the conveyancing process is transparent to all key stakeholders involved in the deed transfer and title deed registration processes.

Adriaan Du Plessis Incorporated (2020) suggested that one possibility is that ECTA can be amended to provide for a more complex framework to regulate smart contracts or that new legislation may be passed to provide for a more autonomous method of contracting. ECTA and the EDRSA need to be amended to allow electronic signatures for immovable properties so that blockchain's innovative features and capabilities, such as smart contracts, can be fully leveraged.

The deployment of a decentralised blockchain land registry will make the land registry more robust and reliable as a public good as well as a data public good. However, to avoid duplication of effort, policies need to be formulated to distinguish or separate certain information such as identity information which is also maintained by other government departments such as the DHA.

A policy with clear scope and objectives for the land registry as a data public good needs to highlight data that is sharable with other stakeholders within the network of land registry administrators and data that is sourced from other data public goods.

7.3 Significance of the Research Study

The significance of this research lies in the identification of the required institutional reforms, such as policies, legislations, and regulations to enable the decentralisation of the land registry and enhance land registry governance by adopting blockchain technology innovation through PPIs.

This research also investigates how blockchain technology innovation can be leveraged to enable the decentralised blockchain land registry to promote greater transparency, accessibility, auditability, security, reliability, and accountability for good governance, to assist in dealing with corruption, fraud, and to support land reform.

This research is significant in the sense that it investigates the current land and real estate sector institutional arrangements, such as the mandate and the centralisation of the current land registry, and some of the land administration and management governance inefficiencies around land reform and the land registry itself, such as fees payable for the Deeds Office services which has a negative impact in terms of accessibility. This itself makes an important contribution to the evidence base required for effective policy intervention.

The case study is also significant because it critically assesses the viability of a decentralised blockchain land registry through PPIs for a viable and feasible collaboration between government through the Deeds Office and other key private role players with interest in the land registry who are involved in the overall land administration and management processes.

This study is significant because it also investigates how blockchain technology innovation can support land reform, which is currently a key government policy reforms for restoring justice to citizens who were previously marginalised. The study is also significant due the potential impact of the digital land registry on the digital economy in South Africa.

7.4 Contribution to the Academic Body of Knowledge and for Consideration by Key Policy Makers

This research contributes to the academic body of knowledge which will assist academics interested in understanding how to deal with land governance inefficiencies issues by transforming the Deeds Office's operating model and through the modernisation of the land registry using blockchain technology to accelerate the implementation of the land reform programme.

This study's empirical evidence, findings and recommendations will be useful for policy and decision-makers within the land and real estate sector, especially those dealing with property and land restitution and land reform programme implementations from key role players such as municipalities, banks, the Deeds Office, estate agents and conveyancers, and officials from government departments regulating the land registry and land reform programme such as the DALRRD and the DHS.

This research puts forward policies and regulations proposals for the Deeds Office or government to consider for a land registry digital transformation enabled by blockchain technology to address land registry inefficiencies. The government will be able to fast track its land reform programme implementation and accurately measure its targets with more secured property and land restitution and be better able to deal with some of the corruption and fraud issues currently in existence.

7.5 Thesis Conceptual Framework and Empirical Evidence Insights

From the findings, discussions, and analysis the thesis demonstrated the relationship between institutional arrangements and good governance or effective governance in a sense that weak institutional arrangements undermine good governance and the public good. The thesis also demonstrates that weak institutional arrangements can negatively impact good governance and a public good, and this can be addressed by applying innovation through technology and digital transformation.

If laws, structures, processes, and technologies in key public and private institutions can be improved or enhanced as part of institutional arrangements to deliver a public good, public good also get improved or enhanced as a result. Another practical implication is that public-private interplays since they seek to achieve collaboration between private institutions and public institutions, can provide a vehicle for the public sector to test early-stage innovations such as blockchain by sharing and leveraging relevant resources and expertise provided by private institutions. The thesis also demonstrates that innovation and digital transformation could be executed in parallel wherein innovating technologies could be quickly tested through a pilot or proof of concept and the later facilitating a broader and more in-depth practical implementation with a broad focus not only on technology but also on skills, training and change management. Countries with similar political economies and institutional arrangements could deploy blockchain to address Land Registry governance inefficiencies.

7.6 Areas for Further Research

This study has identified some data commons such as identity information and further investigation needs to be conducted to assess if identity information should be centralised within the DHA or within the land registry itself to avoid duplication of effort.

Further research can also be conducted to establish how the land registry database can contribute to the land sector data commons, which can aggregate land and properties data from other databases such as the e-cadastre database and the HSS. Further research can also investigate how blockchain can be applied to the land cadastre and integrated with the land registry.

Further research studies can also investigate corruption and fraud in more depth using relevant investigative methodologies. Another area of research is around the new types of corruption and fraud that can emerge or that are emerging through adopting blockchain technology innovation for the electronic land registry and e-government services in general.

Further research can also be conducted to establish the rules for determining which data and information will be stored on a blockchain for the land registry and at which stage that data and information should become immutable, in line with data privacy and protection laws such as POPIA and PAIA.

7.7 Conclusion

This thesis has demonstrated that the Deeds Office, through a digital transformation using blockchain technology innovations, can enhance the current land registry as a public good and address some of the current land governance inefficiencies by increasing transparency, accessibility, auditability, security, reliability, and accountability, which will, in turn, strengthen property and land restitution and support land reform. This thesis concludes that an enhanced, decentralised blockchain land registry would serve as the backbone for the digital economy, with reliable and secured property rights for all South Africans.

Evidence from the land and real estate sector interviewees suggests that there is currently no inclusive, complete, and reliable land registry system to support the effective implementation of land reform, nor to effectively deal with governance issues such as title deed backlogs, high

fees for access to registry records, high costs for buying and selling property, and land corruption or fraud.

This thesis also concludes that a blockchain land registry cannot prevent or stop corruption and fraud from happening. This thesis concludes that the land registry, in its current form, caters primarily for middle- and high-value properties and works quite well for the rich, while the low-value properties and areas in which the majority of South Africans such as townships, communal land and informal settlements remain marginalised and are concentrated amongst the victims of fraud.

Evidence suggests that institutions in both the public and private sectors within the land and real estate sector have common interests when it comes to the land registry, which is to provide secured property rights in the form of title deeds for all South Africans.

The Deeds Office, within its powers, should continue to regulate the land registry, coordinate and manage the interests of other private sector institutions such as banks and cater for the interest of other state institutions with land reform mandates such as the DHS and various municipalities.

The issue of fraud and corruption inefficiencies plaguing land reform and aspects of the land registry cannot be dealt with in isolation. They are part of a broader ecosystem. For the government to minimise current inefficiencies, including some of the corruption and fraud elements, other key role players need to go online as well and be integrated with the blockchain-based, decentralised, public land registry.

Apart from implementing the integrated, secured and decentralised blockchain land registry, the government still needs to deal with broader legal and policy issues, including the erosion of the rule of law. Lawlessness such as communities ganging up against new property owners and communities avoiding paying municipal rates and taxes, water, and sewage, especially in the

low- and middle-income market segments, stands in the way of the state's ability to achieve its land reform objectives and build sustainable land reform housing programmes.

For the successful adoption of the decentralised secured blockchain land registry to benefit the rest of the population, the state also needs to address broadband connectivity issues in remote areas or rural provinces, address issues around the high data prices in South Africa and address issues of digital illiteracy that affects many citizens through blockchain land registry consumer awareness and training programmes and cybersecurity awareness training. Even though there are other alternative technologies to blockchain that can also enhance land registry governance, this thesis demonstrated that blockchain offers unique and well-suited capabilities around decentralisation, security and smart contracts.

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APPENDIX A – IDENTIFIED AREAS OF DISCUSSION, THEMES AND CODES

Areas of Discussion	Theme/ Category	Codes
Land Administration and Management Governance	- Land Registry Impact on Land Reform Programme	- Impact on Land Reform

	<ul style="list-style-type: none">- Confidence and Trust in the current Land Registry- Key Role Players- Current Issues, Challenges, and limitations	<ul style="list-style-type: none">- Confidence and Trust- Key Role Players-- Lack of Transparency- Lack of Accessibility- Lack of Security- Lack of Auditability- Lack of Reliability- Lack of Accountability- Transfers processing delays- High costs of purchasing
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		<p>property in South Africa</p> <ul style="list-style-type: none"> - Incomplete Land Registry
Corruption and Fraud	<ul style="list-style-type: none"> - Forms of Corruption and Fraud - Corruption and Fraud Root Causes - Corruption and Fraud mitigation controls and efforts 	<ul style="list-style-type: none"> - Forms of Corruption - Impact of Corruption and Fraud - Root Causes - Mitigation Controls and Efforts
Decentralisation	<ul style="list-style-type: none"> - Effective Governance - Transparency and Accountability - Policies and Regulations 	<ul style="list-style-type: none"> - Effective Governance - Transparency and Accountability - Policies and Regulations

Blockchain Technology	<ul style="list-style-type: none"> - Blockchain value proposition for anti-Corruption and anti-Fraud - Suitable Blockchain Deployment model - Blockchain readiness and adoption - Policies and Regulations 	<ul style="list-style-type: none"> - Transparency - Security - Accessibility - Auditability - Reliability - Policies and Regulations
Public-Private Interplays	<ul style="list-style-type: none"> - Public and Private Sector Collaboration - Suitable Stakeholders to co-manage the decentralised Land Registry through Public Private Interplays 	<ul style="list-style-type: none"> - Funding - Skills - Human Resources - Infrastructure - Suitable Stakeholders
Innovation and Digital Transformation	<ul style="list-style-type: none"> - Digital Transformation Objectives 	<ul style="list-style-type: none"> - Objectives - Current Inefficiencies

	<ul style="list-style-type: none"> - Deeds Office inefficiencies - Land Registry inefficiencies - Electronic Deeds Registration System Implementation 	<ul style="list-style-type: none"> - Innovation (People, Culture, Policies, Processes, Systems and Technology) - Blockchain Technology Adoption - Change Management - Training and Re-skilling - Citizens Awareness and Training
<p>Institutional Reforms (Policies and Regulations)</p>	<ul style="list-style-type: none"> - Required Policies and Regulations 	<ul style="list-style-type: none"> - Required Policies

		- Required Regulations
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APPENDIX B – SAMPLE INTERVIEWS QUESTIONNAIRES GUIDE

Below closed and open-ended questions were used as a guideline for various semi structured interviews with the selected participants. The questions were not asked in the exact order in some of the interviews depending on the selected participant and due to some of the provided answers and the context during the interviewing process. Questions were structured according to the key selected stakeholders and the research questions for the study.

APPENDIX C – DEEDS OFFICE BASED INTERVIEWS GUIDING QUESTIONS

1. What are some of the fraud and corruption issues or elements have you dealt with as the Deeds Office?
2. Where do you think there are challenges? Or what enables these types of corruption from the Deeds Office perspective? Perhaps we can start from the Deeds Office perspective, and we also look from the external stakeholder’s perspective.
3. What would you say corruption and fraud transactions accounts for? If you are looking at the total annual transactions, is it 10% of the transactions or 8%?
4. How do you detect some of these fraud and corruption elements within the Deeds Office? Looking at the people, systems, processes, and technology that you have or capabilities?

5. Is fraud and corruption a burning issue at the moment? Are you concerned? I want to understand the level of priority; do you prioritise eliminating fraud and corruption?
6. What would you say which areas of the Deeds Office are mostly affected by the fraud and corruption elements?
7. In your opinion, do you think there is currently enough transparency, security, and auditability of the Land Registry, is it easily accessible and transparent to all the key stakeholders from Sellers, Buyers, Developers, Conveyancers, Surveyors, Banks, and SARS?
8. In your opinion if we digitise the conveyancing process in such a way that even things such as "Smart Contracts" becomes legal or made legal in terms of registering immovable properties, do you think it will assist in dealing with corruption and fraud?
9. If the Land Registry is deployed in a decentralised fashion, meaning that it is opened up to allow other stakeholders to co-manage the registry together with the Deeds Office allow Banks to capture their own registration or allow them to capture the registrations by themselves, even other people like Developers, once they are done with the allocations to the beneficiaries in terms of affordable housing , do you think that can result in a greater transparency and visibility which might eliminate fraud and corruption?
10. Which policies and regulations need to be in place or need to be adapted to enable a fully digitised Land Registry which will see the adoption of things such as Smart Contracts and electronic signatures for immovable properties?

APPENDIX D – BLOCKCHAIN VENDORS OR SERVICE PROVIDERS GUIDING QUESTIONS

1. What is your relationship with government registry offices, especially during your pilot implementation or what are your core responsibilities as a technology vendor?
2. What other stakeholders are involved in blockchain Land Registry projects?
3. What do you think is the unique value proposition for blockchain around the Land Registry in particular in relation to property and land corruption and fraud use cases?
4. What format of title deeds are coming from your blockchain platform? Is it an electronic certificate?
5. When you were conducting the pilots, did you pick up any fraud or corruption elements?
6. Smart Contracts or Electronic Contracts, do you think that will assist in dealing with fraud and corruption elements, obviously it will bring efficiencies, but I just want to also understand if that will assist in dealing with the fraud and corruption issues?
7. Do you think the government has the capacity to adopt technologies such as blockchain without partnering with private sector players like your company?
8. What kind of blockchain deployment models are suitable for developing countries like South Africa, especially around the property and land corruption and fraud use case?
9. What do you think will be the best deployment model that will assist in dealing with corruption and fraud?
10. In your opinion do you think a decentralised blockchain Land Registry whereby other stakeholders such as your Centre for Affordable Housing Finance in Africa and the likes of Commercial Banks like ABSA, FNB and even organisations such as SARS whereby they will have a same copy or database of title deeds as the one that the Deeds Office

has and assist in co-managing the Land Registry instead of the Deeds Office the only custodian of the Land Registry system, do you think that deployment model or operating model will assist in dealing with corruption and fraud issues within the land sector?

11. In terms of policies and regulations, have you encountered obstacles or any challenges around current policies and regulations, limitations or any limitations around policies and regulations that you think will prevent the adoption of blockchain land registries?
12. What would you say it is a key differentiator between blockchain and traditional database systems?
13. What are some of the challenges and issues in general that you have encountered during the piloting of blockchain?
14. How can blockchain be integrated with other electronic registration systems? for example traditional database systems? Are you integrating with some of the existing systems during your pilots?
15. What about people such as conveyancers and lawyers, are they keen on technology especially around smart contracts?
16. So, post the implementation of these pilots, has any country actually gone beyond and actually adopted blockchain as a solution for land registration?

APPENDIX E – ESTATE AGENCIES AND CONVEYANCERS GUIDING QUESTIONS

1. In your view does the Deeds Office efficiently and effectively store retrievable property and land ownership data and within reasonable time?
2. Are the property and land records paper based or digital/scanned and searchable? Do you trust that the records are not tampered with?

3. Do you verify the legitimacy; credibility of both the buyer and the seller before the sale and before the registration is concluded? And How?
4. In your opinion do you think people receive bribes or kickbacks during the registration process (people like Estate Agents, Conveyancers/Lawyers, Surveyors, Land Valuators, Deeds Office Officials, Banks Employees, Municipalities Officials (Rates and Taxes) and Politicians)?
5. Based on the answer above, please explain how they receive bribes?
6. Can the contracts be manipulated to enable corruption and fraud?
7. Will contract automation deal with the issue?
8. Have you heard about Blockchain Smart Contracts?
9. Bribes and kickbacks often happen outside the processes and systems, what usually happens within the Land Registry that enables corruption and fraud (i.e. accepting the invalid ID document or fraudulent documents, processing wrong valuations, registering the wrong property or owner)?
10. How does corruption and fraud activities happen around the Land Registry including people, processes, systems, and technologies currently? Where are the gaps and loopholes?
11. What role will Estate Agencies/Lawyers/Surveyors/Banks can play in a decentralised transparent Land Registry particularly to prevent land and property corruption and fraud?
12. Do you think a public-private interplays arrangement with government through the Deeds Office that will allow other private players such as Banks and ICT Service Provider to co-manage the Land Registry with processes visible to all key stakeholders (Estate Agencies, lawyers, Valuators, Deeds Office Officials, Banks employees) will prevent land corruption and fraud?
13. Do you think there is enough Transparency, Security and Auditability within the system?

14. What is the turnaround time within the Deeds Office? Do you experience issues within the process?
15. When conducting the research around property and land in South Africa, what are the current property and land corruption burning issues in South Africa?

APPENDIX F- LIST OF INTERVIEWEES

Interviewees	Position	Organisation	Organisation Description	Date of Interview
Interviewee#1	Research Specialist	Corruption Watch https://www.corruptionwatch.org.za/	Corruption Watchdog	25 March 2021
Interviewee#2	Estate Agent	Pam Golding https://www.pamgolding.co.za/	Real Estate Company	12 March 2021

Interviewee#3	Conveyancer	STBB https://stbb.co.za/	Conveyancing Company	01 st June 2021
Interviewee#4	Subsidised houses Conveyancer	STBB https://stbb.co.za/	Conveyancing Company	08 June 2021
Interviewee#5	Subsidised housing Administrator	Independent Contractor	Subsidised housing Administration Company	11 June 2021
Interviewee#6	Senior Manager	Deeds Office https://www.deeds.gov.za/	Deeds Registry	06 September 2021
Interviewee#7	Senior Manager	Deeds Office	Deeds Registry	19 August 2021

		https://www.deeds.gov.za/		
Interviewee#8	Senior Manager	Deeds Office https://www.deeds.gov.za/	Deeds Registry	25 March 2022
Interviewee#9	Senior Manager	Deeds Office https://www.deeds.gov.za/	Deeds Registry	14 November 2021
Interviewee#10	Senior Manager	Banking Association of South Africa https://www.banking.org.za	Organisation that represents Banks in South Africa	03 December 2021
Interviewee#11	Manager	Property Practitioners Regulatory Authority https://theppra.org.za/	Property Practitioners Regulatory Authority	08 July 2021

Interviewee#12	Senior Manager	71Point4 https://www.71point4.com/	Private Research Company	29 March 2022
Interviewee#13	Senior Manager	Centre for Affordable Housing Finance in Africa (CAHF) https://housingfinanceafrica.org/	Fintech, affordable housing	13 August 2021
Interviewee#14	Senior Manager	Seso Global https://app.seso.global/properties/home	Leading Blockchain Vendor	22 June 2021
Interviewee#15	Senior Manager	Chromaway https://chromaway.com/	Leading Blockchain Vendor	24 March 2021
Interviewee#16	Blockchain Technology Architect	Chromaway https://chromaway.com/	Leading Blockchain Vendor	22 March 2021

Interviewee#17	Legal Officer	Legal Practice Council of South Africa https://lpc.org.za/	Professional Body for Conveyancers, Notaries and Bond Attorneys	24 May 2022
Interviewee#18	Policy and Development Manager	City of Johannesburg- Department of Housing https://www.joburg.org.za/	City of Johannesburg Housing Department	30 September 2021
Interviewee#19	Monitor	Deeds Office https://www.deeds.gov.za/	Deeds Registry Agency	21 August 2021
Interviewee#20	Head of Data	Lightstone (Deeds Office third-party Land Registry data and information commercial services provider) https://www.lightstone.co.za/	Deeds Office Third-party service provider	25 November 2021

Table 4-1: List of Interviewees (Source: Author Compilation)

APPENDIX G – GOVERNMENT BENEFICIARIES ALLOCATION PROCESS

1. Citizens needing housing assistance must approach the local municipal housing office to obtain and complete a registration form for a housing opportunity which can be in the form of:

Obtaining a Subsidised House from Government Social Housing Finance Linked Individual Subsidy Programme (FLISP) Housing Obtaining a Serviced Site.

2. The citizen gets registered on the municipality's Housing Demand Database to stand in line for becoming a beneficiary of the housing opportunity once it becomes available. This could be in the form of a housing project, public rental housing or available funding.

3. Municipalities continuously plan for housing opportunities in the form of housing projects. These plans are submitted to the Western Cape Department of Human Settlements for approval to which funding will be allocated to. Such a plan takes a while to draft and involves a feasibility study, an environmental impact study, integration with local facilities making sure it is close to schools, work and business opportunities and health facilities.

4. The development of the project can commence once the project plan is approved together with other approvals and funding allocation by the Western Cape Government such as land acquisition, servicing, and site preparation.

5. The municipality will then apply its selection criteria as set out in its approved housing allocation policy to preselect a short list of potential beneficiaries for the project.

6. These preliminary selected households' information is then captured from the subsidy application forms into the Housing Subsidy System (HSS) which does several checks against the Population Register, Deeds Office, the Unemployment Insurance Fund (UIF) and other Government systems to ensure that applicants still qualify. Several rounds of beneficiary selection may take place, removing applicants who do not qualify, until all the housing opportunities have been allocated. The municipality will then make contact with the shortlisted potential beneficiaries to determine whether they are still interested and to get them to complete subsidy application forms (in the event that the project is a Breaking New Ground (BNG) housing subsidy project). It is thus very important that applicants keep their details, especially their contact information, on the housing database up to date to ensure that they are easily contactable.

7. The municipality will then publicise the beneficiary list in its local offices for public scrutiny.

8. Once all planning and project approval processes have been successfully completed, construction can now take place. Projects are usually executed in phases where housing opportunities are handed over continuously until the whole project is complete and signed off.

9. Once complete, beneficiaries will be contacted to inform them that they may now take occupation of the residential unit. Please note that paperwork, such as title deeds, will occur in parallel. If the housing opportunity involves a rental dwelling, the applicants will sign a lease when taking occupation of the rental unit.

APPENDII H- SUMMARY OF QUALITATIVE FINDINGS

Research Focus Areas	Identified Themes	Summary of the Findings
Deeds Office and Land Registry Current Institutional Arrangements	Key Role Players	<ul style="list-style-type: none"> • Findings suggest that central to the Land Registry there are key role players such as Estate Agents, Subsidised housing Administrators, Conveyancers, Bond Attorneys and Deeds Officials such as Examiners and Monitors. • Findings also suggest that Conveyancers are the main drivers of the Land Registry processes and interact with the Deeds Office officials.

	Forms of corruption and Fraud	<ul style="list-style-type: none">● Findings suggest that corruption is initiated by humans and often occurs outside the Land Registry. However, the Land Registry system can be manipulated to enable corruption or fraud due to the current inefficiencies.● Findings also suggest that fraud rather than corruption is more possible around the actual Land Registry, and it can be made possible through the submission of forged documentation such as identity documents, marriage certificates, marriage contracts, wills, court orders, company registration documents, transfer duties certificates, electrical certifications, valuations reports and municipal rates clearance certificates. However, corruption and principal-agent problems are also possible whereby the Deeds Office officials can accept bribes from buyers, sellers, estate agents and conveyancers to manipulate records within the Land Registry to enable fraudulent transactions.● Findings suggest that principal-agent problems can also occur whereby councillors, municipalities' officials, and traditional leaders solicit bribes or kickbacks from the citizens or beneficiaries of land reform programmes such as subsidy and affordable housing and land claims in general.
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		<ul style="list-style-type: none"> ● Findings also suggest that collective action problems are also possible whereby Deeds Officials can participate in a systemic corruption by colluding with other key stakeholders such as estate agents, conveyancers, Banks officials and SARS officials and enable fraudulent transactions by manipulating records on the Land Registry.
	Corruption and Fraud Root Causes	<ul style="list-style-type: none"> ● Findings suggest that heavy paper based, and manual driven Land Registry processes are the main root causes of fraudulent transactions around the Land Registry. ● Inefficiencies such as current title deeds backlog and incomplete Land Registry are also enabling fraudulent transactions within the low value property market segments. ● Other inefficiencies such as long periods of duration in terms of processing deeds transfers can enable both corruption and fraud whereby the Deeds Office officials can accept bribes to fast track the deeds transfer processing for some of the transactions.

		<ul style="list-style-type: none"> ● Findings also suggest that high costs of purchasing property in South Africa can also motivate buyers and sellers to seek ways to reduce the costs by bribing some of the stakeholders including estate agents, conveyancers, and the Deeds Office officials. ● Findings also suggest that lack of consumer awareness and total reliance on the estate agents and conveyancers can make buyers and sellers vulnerable to corruption and fraud.
	<p>Corruption and Fraud Challenges and Issues</p>	<ul style="list-style-type: none"> ● Evidence also suggests that there is lack of accountability and prosecution regarding corruption and fraud within the land and real estate sector. ● Findings also suggest that the Government is failing to hold perpetrators of corruption and fraud within the land and real estate sector accountable due to lack of reliable evidence and frequent changes of investigators.

Corruption and Fraud Institutional Analysis	Corruption and Fraud current mitigation Controls and Efforts	<ul style="list-style-type: none"> • Evidence suggests that key stakeholders such as the Estate Agencies, Conveyancers, Banks, and SARS do have some mitigation controls in place to detect and prevent corruption and fraud. For example, the FICA process is one of the processes that assist in detecting and preventing corrupt or fraudulent transactions.
Land Registry Governance Institutional Analysis	Confidence and Trust in the current Land Registry	<ul style="list-style-type: none"> • All interviewees indicated that they have faith in the Deeds Office and trust the Land Registry and regard the South African Deeds Registration System as one of the best in the world.
	Land Registry Impact on	<ul style="list-style-type: none"> • Evidence indicates that there is currently a title deeds registration backlog for Reconstruction Development Programme (RDP) subsidised housing programme which is one of the major land reform programmes in

	Land Reform Programme	<p>South Africa and as a result this creates a fertile environment for corruption and fraud around subsidised housing.</p> <ul style="list-style-type: none"> ● The residents or citizens that reside within communal land currently owned and managed by traditional leaders have less security of tenure which will further fuel corruption and fraud in the poor and low-income property market segments.
	Land Administration Governance Institutional Analysis (Lack of	<ul style="list-style-type: none"> ● Findings suggest that for the cash transactions, key stakeholders such as the Banks that provide necessary checks and balances to detect and prevent fraud are not involved. Due to lack of transparency corruption and fraud can occur between a buyer and a seller. ● Findings suggest that current Deeds Office mandate and reliance on conveyancers also reduce the level of transparency required to detect and prevent corruption and fraud. ● Findings suggest that information asymmetries between principals and agents, lack of information, awareness and training amongst buyers and sellers makes them vulnerable to corruption and fraud elements (Information and services are not accessible).

	<p>transparency, lack of Accessibility, lack of reliability, transfers and registration processing delays and high costs of purchasing property)</p>	<ul style="list-style-type: none"> ● Findings suggest that Regional Deeds Office officials are only allowed to process transactions within their own jurisdictions and because of lack of transparency this can also enable some of the transactions to be processed more than once in the event of fraudulent transactions. ● Findings suggest that most buyers and sellers are not familiar with the processes and services offered by key stakeholders such as the Property Practitioners Regulatory Authority who can assist them to deal with some of the fraud ● Findings suggest that cash transactions do not go through the robust checks and balances like the bonded transactions and are vulnerable to corruption and fraud. ● Findings suggest that corruption and fraud currently cannot easily be detected by the Deeds Office unless corruption and fraud get reported to the Deeds Office. ● Findings suggest that the current inefficiencies such as paper based, and manual processes also reduce the level of transparency, security, accessibility, and auditability required to deal with corruption and fraud.
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		<ul style="list-style-type: none">● Findings suggest that buyers and sellers lack knowledge about the Deeds Office information services and what to check for to avoid becoming victims of corruption and fraud. This is because there are also payable fees to access the Deeds Office and the Land Registry on top of the estate agents and conveyancers' fees.● Findings indicate that currently the Registrar of Deeds in different jurisdictions are only allowed to register properties within their jurisdictions. This can potentially enable fraudulent transactions due to reduced transparency amongst the Registrars.● Findings also indicate that buyers and sellers are not aware of the services that might assist them to prevent them from becoming victims of corruption and fraud provided by key stakeholders such as the Properties Practitioners Regulatory Authority and the Legal Practice Council.● Findings indicate that most properties are owned by the majority of the citizens who are poor and are the beneficiaries of the land reform programmes. They are unable to access the Deeds Office and the Land Registry services due to payable fees and the fact that one needs to appoint a lawyer who is a conveyancer.● Findings indicate that there are currently title deeds registration backlogs for the Reconstruction Development Programme (RDP) subsidised housing programme.
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		<ul style="list-style-type: none"> • Documents lodged with the Deeds Office get lost or go missing due to the volume of papers that goes to the Deeds Office. • Findings suggest that it is still taking longer to transfer and register a property in South Africa. This can go up to 3 months and 10 working days and enable corruption and fraud whereby some stakeholders can bribe the Deeds Office officials in exchange of favours to fast track the deeds transfer and title deeds registration.
<p>Innovation and Digital Transformation to transform the Deeds Office</p>	<p>Innovation and Digital Transformation Objectives</p>	<ul style="list-style-type: none"> • Findings suggest that the Deeds Office has already embarked on a digital transformation journey and identified some of the initiatives to implement the Electronic Deeds Registration Act of 2019.

<p>and the Land Registry.</p>	<p>Innovation and Digital Transformation to build an integrated Land Registry system.</p> <p>Innovation and Digital Transformation</p>	<ul style="list-style-type: none"> ● Findings suggest that the first phase of digital transformation is to digitize the existing paper-based deeds transfers and title deeds into electronic documents. ● Findings suggest that property purchasing processes are also still manual and paper driven including the Offer to Purchase that a buyer and seller sign as a sale agreement and need to be automated. ● Findings also suggest that the current Land Registry known as the Deeds Registration System (DRS) is currently not integrated with other key stakeholder’s systems such as SARS, Banks, municipalities and the CPIC.
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	<p>on to build an inclusive and complete Land Registry.</p> <p>Digital Transformation to Raise Awareness about the new Land Registry, facilitate re-</p>	<ul style="list-style-type: none"> ● Findings suggest that an integrated Land Registry will enable the decentralisation of the Land Registry. This will increase transparency and accessibility among various stakeholders. ● Findings suggest that the new secured decentralised Land Registry will facilitate the deployment of an inclusive integrated Land Registry with more stakeholders to capture deeds transfers. This will help fast track the deeds and title deeds registration for subsidised properties, properties within communal land and within informal settlements so that the Land Registry can become complete. ● Findings also suggest that due to high levels of illiteracy and unemployment in South Africa, the adoption of blockchain for the Land Registry must be cognisant of the poor households with no technology skills
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	<p>skilling and upskilling and training to all key stakeholders and public at large</p>	
<p>Blockchain Technology for Effective Governance</p>	<p>Blockchain Unique Value Proposition for Anti-</p>	<ul style="list-style-type: none"> ● Findings suggest that blockchain can bring more transparency, security, auditability, accessibility, and accountability with its unique features such as immutable records, distributed nodes, and smart contracts. ● Findings suggest that blockchain can also provide more future proof and secured storage for documents for deeds transfers and actual title deeds. ● Findings suggest that blockchain has not been fully adopted for the Land Registry globally following the blockchain based Land Registry pilots.

	<p>corruption and fraud</p> <p>Blockchain Readiness and Adoption</p>	<ul style="list-style-type: none"> ● Findings suggest that by highlighting other benefits offered by blockchain to the government such as the ability for the government to start charging for services and collecting revenue through increased access and reliable records, these can accelerate the adoption of blockchain Land Registry.
<p>Decentralisation for Effective Governance</p>	<p>Decentralisation to promote effective governance.</p>	<ul style="list-style-type: none"> ● Findings suggest that the decentralised Land Registry through private permissioned blockchain can enable the new institutional arrangements with the network of administrators from key stakeholders to co-manage the Land Registry with the Deeds Office which will enhance transparency. ● Findings suggest that Blockchain decentralisation for the Land Registry is not necessarily as open as in the case of bitcoin or cryptocurrency. ● Findings indicate that decentralised Land Registry through private permissioned blockchain can also enable other key stakeholders such as the Properties Practitioners Regulatory Authority and the Legal

	<p>Blockchain Decentralisation options</p> <p>Conveyancers' role in a decentralised environment.</p> <p>Deeds Office role in the</p>	<p>Practice Council to have visibility on their Estate Agencies and Conveyancers members involved in property transactions.</p> <ul style="list-style-type: none"> ● Findings also suggest that Incentives for the private sector stakeholders will also influence which stakeholders are keen to form part of the decentralised blockchain Land Registry. ● Findings suggest that decentralisation can allow the government to extend the Land Registry also to municipalities, councillors and the potential Deeds Office districts or satellite offices and increase Land Registry administration capacity so that more deeds transfers and title deeds can be registered in remote areas especially for subsidy and affordable houses. ● Findings indicate that Conveyancers can still be required to adjudicate what goes to the blockchain and to conduct checks and balances to guarantee the integrity of the Land Registry system. ● Findings suggest that the Deeds Office can also play an “authenticator” role in a consensus based decentralised Land Registry.
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	decentralised environment.	
Public-private Interplays for Effective Governance	Public and Private Sector Stakeholders involved in blockchain Land Registry pilot projects	<ul style="list-style-type: none"> ● Findings indicate that blockchain Land Registry pilots proved that the private sector could provide the necessary resources including funding, skills, blockchain technology itself or platform and the required ICT infrastructure. ● Findings also suggest that private sector organisations from the financial services sector, research consultancy companies focusing on the land and real estate sector, telecommunications service providers and blockchain technology service providers are some of the organisations supporting blockchain Land Registry pilots through the public-private interplays together with Government departments such as the Land Registry offices and municipalities.

<p>Institutional Reforms (Policies and Regulations to enable Decentralisation and the Adoption of the Blockchain Technology Innovation)</p>	<p>Deeds Office Mandate Conveyancer's Mandate Data Migration and Title Deeds Backlog Adoption of Digital or Electronic Signatures</p>	<ul style="list-style-type: none"> ● Findings indicate that the Deeds Registration Act will need to be updated to redefine the role of the Deeds Office in a new decentralised Land Registry environment. ● Findings also indicate that the Deeds Registration Act will need to be reviewed to redefine the role of the Conveyancers in a new decentralised Land Registry environment. ● Findings indicate that to resolve the issues of title deeds, the government must consider or establish a backlog dispute resolution to bring the Land Registry up to date with all the title deeds for subsidised houses. ● Findings indicate that currently electronic signatures are not allowed for immovable properties except only by the Banks when processing the bond agreements. Legislature will need to be amended to allow the use of electronic signatures for immovable properties. ● Findings also indicate that electronic or smart contracts can be adopted to automate agreements such as “Offer to Purchase”, and other agreements or contracts.
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	and Smart Contracts	
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Table 6-1: Summary of Findings (Source: Authors Own Compilation)

APPENDIX J-TRANSPARENCY INTERNATIONAL, SOUTH AFRICA DOING BUSINESS 2020 REPORT INDEXES

- Equal Access to Property Rights Index

Location	Equal access to property rights index (-2 0)	Do unmarried men and unmarried women have equal ownership rights to property?	Do married men and married women have equal ownership rights to property?
Buffalo City (East London)	0.0	Yes	Yes
Cape Town (Cape Town)	0.0	Yes	Yes
Ekurhuleni (Germiston)	0.0	Yes	Yes
eThekweni (Durban)	0.0	Yes	Yes
Johannesburg (Johannesburg)	0.0	Yes	Yes
Mangaung (Bloemfontein)	0.0	Yes	Yes
Msunduzi (Pietermaritzburg)	0.0	Yes	Yes

- Transparency of Information Index

Location	Transparency of information index (0-3)	Who is able to obtain information on land ownership at the agency in charge of immovable property registration in the largest business city?	Is the list of documents that are required to complete any type of property transaction made publicly available And if so, how?	Is the applicable fee schedule for any property transaction at the agency in charge of immovable property registration in the largest business city made publicly available And if so, how?	Link for online access:	Does the agency in charge of immovable property registration commit to delivering a legally binding document that proves property ownership within a specific time frame And if so, how does it communicate the service standard?
Buffalo City (East London)	3.5	Anyone who pays the official fee	Yes, in person	Yes, online	http://www.deeds.gov.za/ITSOD http://www.ghostdigest.co.za/ca/of-oosts/1571	Yes, on public boards
Cape Town (Cape Town)	3.5	Anyone who pays the official fee	Yes, in person	Yes, online	http://www.deeds.gov.za/ITSOD http://www.ghostdigest.co.za/ca/of-oosts/1571	Yes, on public boards
Ekurhuleni (Germiston)	3.5	Anyone who pays the official fee	Yes, in person	Yes, online	http://www.deeds.gov.za/ITSOD http://www.ghostdigest.co.za/ca/of-oosts/1571	Yes, on public boards
eThekweni (Durban)	3.5	Anyone who pays the official fee	Yes, in person	Yes, online	http://www.deeds.gov.za/ITSOD http://www.ghostdigest.co.za/ca/of-oosts/1571	Yes, on public boards
Johannesburg (Johannesburg)	3.5	Anyone who pays the official fee	Yes, in person	Yes, online	http://www.deeds.gov.za/ITSOD http://www.ghostdigest.co.za/ca/of-oosts/1571	Yes, on public boards