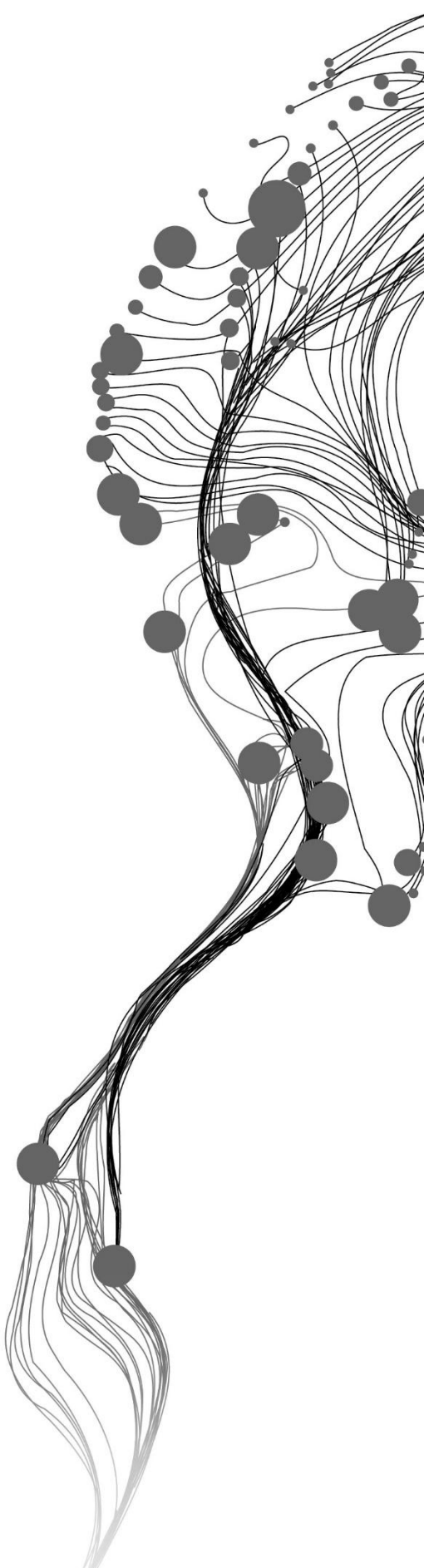


# **EXTENDING LADM FOR INTEGRATED LAND GOVERNANCE: LOCALIZING THE MODEL TO CAPTURE CUSTOMARY TENURE IN DOME, GHANA**

HENRY ADJANOR TETTEH  
JUNE 2025

SUPERVISORS:  
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**HENRY ADJANOR TETTEH**  
Enschede, The Netherlands, June 2025

**SUPERVISORS:**  
Dr. Malumbo Chipofya  
Dr. Dimo Todorovski

**THESIS ASSESSMENT BOARD:**  
[Prof. mr. dr. ir. J.A. Zevenbergen (Chair)]  
[Dr. A. Kara (External Examiner, Gebze Technical University Turkey)]  
etc

## **DISCLAIMER**

This document describes work undertaken as part of a programme of study at the Faculty of Geo-Information Science and Earth Observation of the University of Twente. All views and opinions expressed therein remain the sole responsibility of the author, and do not necessarily represent those of the faculty.



## ABSTRACT

In Ghana's peri-urban areas such as Dome, land tenure systems are shaped by the coexistence of statutory and customary regimes, producing inconsistent land records, overlapping claims, and persistent tenure insecurity. Despite legal reforms and digitization efforts, most land remains undocumented or governed by informal norms, undermining trust in formal land governance. The Land Administration Domain Model (LADM) offers a standardized framework for documenting diverse tenure types, but its implementation in Ghana has remained limited and misaligned with customary realities.

This study employs a design science research methodology to investigate how local tenure practices in Dome can inform the development of a localized LADM-based model. Qualitative data were collected through semi-structured interviews, focus group discussions, and stakeholder engagement with landholders, chiefs, and institutional actors. Thematic analysis revealed key features of Dome's land tenure landscape, including oral transactions, inheritance-based claims, informal boundary markers, and overlapping land rights.

Based on these insights, the study proposes an adapted conceptual model grounded in LADM that reflects both statutory requirements and customary practices. The model was validated through participatory evaluation with domain stakeholders, including Lands Commission officials, customary land secretariat staff, residents and legal practitioners. Using criteria such as representational accuracy, legal alignment, and implementation feasibility, stakeholders reviewed the model against real-world tenure scenarios. Their feedback led to iterative refinements, such as adding locally resonant terminology and accommodating oral documentation types, ensuring the model's contextual fit and institutional applicability. This research contributes to the literature on integrated land governance by demonstrating how global data standards can be tailored to diverse tenure systems, enhancing tenure security and supporting inclusive urban development in Ghana and similar contexts.

## ACKNOWLEDGEMENTS

First and foremost, I would like to express my profound gratitude to God for providing me with the strength, wisdom, and perseverance needed to embark on and complete this study. His guidance and blessings have been instrumental in achieving this milestone.

I would like to express my deepest appreciation to my supervisors, Dr. Malumbo Chipofya and Dr. Dimo Todorovski, for their expert guidance, patience, and critical insights throughout this research. Their mentorship greatly shaped both the conceptual development and practical execution of this thesis.

My sincere thanks also go to the staff and faculty of the Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente, for the academic foundation, technical training, and administrative support that made this research possible.

I am deeply grateful to the community members of Dome, Ghana, including traditional authorities, residents, family heads, tenants, and institutional officials, who participated in the study. Your openness and contributions are central to the success of this work. I am also thankful to the field assistant who provided invaluable help with logistics and translation.

I acknowledge the stakeholders and domain experts who participated in the model validation phase. Your thoughtful feedback and professional input enhanced the contextual accuracy and usability of the proposed LADM-based model.

I am equally grateful to my colleagues and fellow researchers, whose encouragement, critical feedback, and collaboration at various stages of this research significantly enriched its quality.

Finally, heartfelt thanks to my family and close friends for their enduring support, patience, and encouragement throughout this journey. Your belief in me sustained my motivation during the most demanding phases of this thesis.

This work is dedicated to all those working toward equitable and integrated land governance in Africa and beyond. I hope it contributes meaningfully to the ongoing efforts to recognize and strengthen customary tenure systems, reduce land-related conflict, and promote socially inclusive, secure, and sustainable land administration for future generations.

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## LIST OF ACRONYMS

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ADR – Alternative Dispute Resolution  
ATLAS – ATLAS.ti (Computer-Aided Qualitative Data Analysis Software)  
BIM – Building Information Modeling  
CAQDAS – Computer-Assisted Qualitative Data Analysis Software  
CLS – Customary Land Secretariat  
DSR – Design Science Research  
FELA – Framework for Effective Land Administration  
FFPLA – Fit-For-Purpose Land Administration  
FGD – Focus Group Discussion  
FLTS – Flexible Land Tenure System  
GELIS – Ghana Enterprise Land Information System  
GIS – Geographic Information System  
GLTN – Global Land Tool Network  
ISO – International Organization for Standardization  
LADM – Land Administration Domain Model  
LAP – Land Administration Project  
LIS – Land Information System  
LSE – Lean Systems Engineering  
PGIS – Participatory Geographic Information Systems  
RRR – Rights, Restrictions, Responsibilities  
SDG – Sustainable Development Goal  
STDM – Social Tenure Domain Model  
UML – Unified Modeling Language  
UN – United Nations  
VGGT – Voluntary Guidelines on the Responsible Governance of Tenure

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# 1. INTRODUCTION

## 1.1. Research Background

Global urbanization has accelerated in recent decades, raising urgent issues around land tenure security. Over half of the world's population now lives in cities, a proportion projected to reach about 68% by 2050 (World Bank, 2022). Much of this urban growth is concentrated in developing regions and often outpaces formal planning, resulting in the expansion of informal settlements. The United Nations estimates that nearly 1.1 billion people reside in slums or informal settlements worldwide, typically without secure land rights and under constant threat of eviction (World Economic Forum, 2023). Secure tenure is increasingly recognized as a foundation for sustainable urban development, influencing social stability, investment, and the achievement of global goals, such as SDG 11 on inclusive, safe, and resilient cities (UN-Habitat, 2020; World Economic Forum, 2023).

Sub-Saharan Africa faces particularly acute challenges of rapid urbanization and tenure insecurity. The region has the world's highest rate of urban residents living in informal settlements; over half of the urban population in sub-Saharan Africa lives in informal settlements (UN-Habitat, 2022). Within this context, Ghana exemplifies the complex land tenure landscape found in many African countries. Ghana operates a dual land tenure system, characterized by statutory (formal, state-administered) and customary (traditional, communal) ownership regimes (Arhinful, 2021; Owusu Ansah, 2022). Approximately 70–80% of land in Ghana is held under customary tenure, controlled by stools, skins, or family lineages, while the remainder is public or vested land are managed under statutory law (Asafo, 2022; Ghana Audit Service, 2023).

This dual land tenure system, rooted in colonial history and the coexistence of formal and customary legal systems, allows for local autonomy over land; however, it also produces overlaps and inconsistencies between customary claims and the formal land registry (Salifu et al., 2019; Alhola & Gwaindepi, 2024). Indeed, a recent audit by the Ghanaian Auditor-General found persistent inefficiencies in land administration: Most land transactions take far longer than the targeted 90-day registration period (often exceeding a year), and a lack of accessible ownership information has enabled fraudulent sales by wrongful claimants (Ghana Audit Service, 2023). Despite land reform efforts, such as the Land Administration Project (LAP) initiated in 2003 and a new Land Act enacted in 2020 to harmonize laws, progress toward tenure security has been limited (Arhinful, 2021; Alhola & Gwaindepi, 2024). Studies show that having a formal title does improve landholders' perceived tenure security, yet customary land governance remain deeply entrenched and can still provide *de facto* security in some communities (Alhola & Gwaindepi, 2024). This underscores that formalization alone is not a panacea; policy solutions must accommodate local customary practices and socio-cultural norms.

The challenges of land tenure are especially pronounced in peri-urban areas of Ghana's major cities, where rapid urban expansion meets traditional landholding. Dome, a fast-growing peri-urban community on the outskirts of Accra, illustrates these dynamics. Formerly under customary ownership and largely rural, Dome has urbanized swiftly due to Accra's growth, leading to soaring land values and competition for land (Asafo, 2023). In such areas, land rights are often ambiguously documented, caught between informal customary arrangements and incomplete integration into the formal registry (Owusu Ansah, 2022; Okine, 2024). This documentation gap manifests in many residents lacking proper titles or holding only informal sale agreements and allocation papers.

Dome, therefore, presents an ideal case for studying how standardized land models can be made responsive to real-world, customary and statutory land governance systems. While the Land Administration Domain Model (LADM) provides a global standard for documenting land rights, it does not automatically reflect the social, cultural, and institutional complexity found in places like Dome, where oral agreements, family inheritance, and informal transactions are common. Although some efforts to localize LADM have been made in countries such as Kenya and Namibia, these tend to operate at the national or rural scale and often lack deep engagement with peri-urban communities where tenure systems are hybrid, undocumented, and contested. In Ghana, such efforts

remain limited and underdeveloped, particularly at the neighbourhood level, where land tenure practices defy simple classification and are often embedded in dynamic customary relationships. Capturing these community-based understandings is essential for developing an adjusted LADM that is not only technically robust but also socially legitimate and usable.

The scientific relevance of this study lies in its use of design science methodology, which involves constructing a conceptual model (an adapted LADM profile) that is technically rigorous and grounded in empirical data. The model is validated through domain stakeholder feedback and evaluated for its potential to improve interoperability between statutory and customary land information registry. This contributes to the broader scientific effort of reconciling global data standards with local tenure realities, an area where there remains a critical gap in the literature and practice, particularly in Sub-Saharan Africa.

Ultimately, the study aims to generate knowledge that is replicable, transferable, and embedded in lived experience. It contributes to theory by enriching the discourse on the continuum of land rights, and to practice by offering a conceptual model that supports integrated land governance. The localized model of LADM developed here represents an original contribution to the design of adaptive land administration governance. It aspires to serve as a prototype for customizing international land data models to reflect pluralistic, community-grounded tenure realities.

## 1.2. Research Problem Statement

In Dome, the coexistence of customary and statutory land governance has produced overlapping claims, undocumented transactions, and weak integration between customary records and the formal land registry. Most land remains unregistered, and informal sales, oral agreements, and family-based inheritance practices dominate local land transactions. Despite legal reforms such as the Land Act of 2020 and the Land Administration Project (LAP), formal land registration rates remain low, with fewer than 10% of parcels registered nationwide (World Bank, 2018). Residents often view the formal system as expensive, bureaucratic, and untrustworthy.

As a result, Dome is plagued by conflicts and insecurity. Families and chiefs sometimes disagree over rightful ownership boundaries, and there have been instances of the same plot being sold multiple times to unsuspecting buyers (Okine, 2024; Ghana News Agency, 2024). Lengthy court litigations over land are common, and because formal dispute resolution is slow, some actors resort to extra-legal measures. Notably, the phenomenon of “*landguardism*” has emerged, the use of private armed guards by rival claimants to enforce land claims or intimidate occupants. Although the practice of hiring “land guards” was outlawed by Ghana’s Land Act 2020, it persists in communities like Dome and other peri-urban Accra areas, reflecting the desperation to secure property in a context of weak enforcement (Asafo, 2022; Joannides, 2023). For example, media reports recount violent clashes in Dome, where armed land guards destroyed homes and threatened residents on behalf of disputing landlords (Ghana News Agency, 2024; Asafo, 2023). These incidents underscore how tenure insecurity can translate into physical insecurity and social instability at the local level. These dynamics create an uncoordinated land information environment that undermines tenure security, equitable access, urban planning, and public trust in land governance systems.

Efforts to harmonize Ghana’s dual tenure practices, have made limited progress in integrating customary rights into formal land administration in a consistent and technically structured manner. Land Administration Domain Model (LADM) provides an internationally recognized conceptual model for documenting people-to-land relationships, its application in Ghana remains underdeveloped particularly at the peri-urban or community level.

There is currently no localized land administration model in Ghana that reflects the complex, customary tenure practices prevalent in peri-urban areas such as Dome. This gap contributes to persistent tenure insecurity, poor interoperability between statutory and customary land records, and mistrust in formal land governance. As stated earlier, although the LADM offers a flexible and extensible schema suited for documenting diverse tenure types, it has not been adapted to the sociocultural and institutional realities of peri-urban Ghana. Without such adaptation, formal land governance risk remaining misaligned with ground-level practices, limiting their effectiveness and legitimacy (de Soto, 2000; Lemmen & Bennett, 2020).

This study focuses on a critical gap in Ghana's land governance landscape: the absence of a localized, empirically grounded adaptation of the Land Administration Domain Model (LADM) that captures the complexity of peri-urban customary tenure. While preliminary proposals made by scholars like (Arko-Adjei, 2011; Lemmen & Bennett, 2020) for a national LADM country profile, it made Okyere in 2021 to propose a national-level profile. While national-level efforts to develop an LADM profile exist (Okyere et al., 2021), these remain largely conceptual and do not reflect the intricacies of community-level practices.

In places like Dome, customary institutions, oral records, and social norms continue to shape land access and control, but some of these elements are not systematically represented in current land information registries. Specifically, existing models often overlook how local dispute resolution mechanisms, undocumented transactions, and oral histories can be systematically represented in structured data models.

One underexplored challenge is the distinction between capturing the data outputs of customary tenure practices (e.g., allocation notes, verbal agreements) versus representing procedural aspects, such as the social processes through which land is allocated, claims are validated, or disputes are resolved. For instance, while Okyere et al. (2021) propose an LADM country profile for Ghana, their model does not address how to embed procedures like community arbitration or elder-led validation into the LADM schema. Nor does it specify how such practices might be encoded as part of either the source class or the rights-relationship dynamics within LA\_RRR. This procedural omission creates a representational gap between formal model structures and the lived realities of land governance in communities like Dome.

Moreover, Dome presents a uniquely fragmented tenure environment characterized by multi-claim transactions, undocumented sales, and overlapping customary and statutory claims, which most standardized models cannot adequately represent. Current land information systems are designed to avoid or eliminate overlapping claims, yet the socio-political reality in Dome demands a system that can register contested claims, encode disputes, and recognize co-existing customary narratives without prematurely resolving them. Such a model must accommodate not only formal documentation but also oral agreements, family allocation hierarchies, and informal spatial references, elements that are critical for legitimacy but often absent in formal land governance.

This research therefore seeks to develop a localized LADM-based model for Dome, informed by empirical engagement with chiefs, land users, officers, and residents. It will identify which social and customary features require extension within the LADM schema and propose how these can be integrated into a technically sound and institutionally relevant profile. In doing so, the study aims to produce not just a conceptual model but also test practicality of model as capable of guiding documentation, interoperability, and dispute recognition in such tenure contexts. This approach aligns with the continuum of land rights and supports broader efforts toward inclusive, hybrid governance.

### **1.3. Research Objective**

This study uses a design science approach to investigate how local land tenure practices in Dome, Ghana, can inform the adaptation of the Land Administration Domain Model (LADM) for improved integration of customary and statutory systems. The main objective is addressed through four specific research objectives.

#### **Main research objective**

To examine the land tenure environment in Dome, Ghana, and develop a localized, LADM-based conceptual model that seeks to integrate statutory, customary, and informal land rights to improved land governance.

**Research sub objectives**

1. To explore how land is accessed, used, and secured in Dome, and the factors influencing tenure security.
  - a) How is land accessed and used for residential, economic, and social purposes?
  - b) What types of land disputes are most common, and what are their underlying causes?
  - c) What conditions contribute to residents perceived land tenure security or insecurity?
  
2. To assess the applicability of LADM to Dome's tenure context and identify necessary adaptations.
  - a) How do overlapping claims, undocumented transactions, and informal records affect the applicability of LADM?
  - b) What modifications are required to make LADM responsive to local tenure practices?
  - c) What socio-cultural norms shape land access and control, and how do these interact with formal data models?
  
3. To develop a conceptual model based on LADM that represents Dome's land tenure arrangements.
  - a) What entities (e.g., persons, families, stools, authorities) and tenure types should be included in the model?
  - b) How can customary and informal tenure claims be structured within LADM classes and relationships?
  - c) What key relationships between people, land, and rights must be included to reflect how land is really accessed and controlled in Dome?
  
4. To validate the proposed model and assess its fit for practical implementation in Dome's land governance system.
  - a) Does the model align with stakeholder expectations and institutional realities in Dome?
  - b) Can the model support tenure documentation, conflict reduction, and data integration?
  - c) What refinements are needed to enhance its scalability and potential for implementation?

**1.4. Conceptual Framework**

This study is guided by a conceptual framework that positions the Land Administration Domain Model (LADM) as a mediating schema between Ghana's dual land governance i.e., statutory and customary. LADM provides a structured ontology for documenting land rights, restrictions, responsibilities, and spatial units, including both formal titles and informal or customary claims (Lemmen et al., 2015).

In the context of Dome, where customary land allocations coexist with weak formal registration, the framework conceptualizes three key domains: Local tenure practices (including oral transactions, family-based allocations, and inheritance customs), Institutional structures (statutory agencies i.e., Lands Commission and customary authorities such as, stools and family heads), Land data infrastructure (spatial records, boundary approximations, and land claim documentation).

The framework posits that by customizing LADM to reflect local tenure realities, such as including attributes for oral agreements, family consents, and customary dispute mechanisms, it is possible to build a unified land information model. This model is expected to enhance tenure security, support interoperability, and improve trust in the land governance system. Dispute resolution is included as a cross-cutting mechanism linking both statutory adjudication and customary mediation (Barry & Danso, 2014).



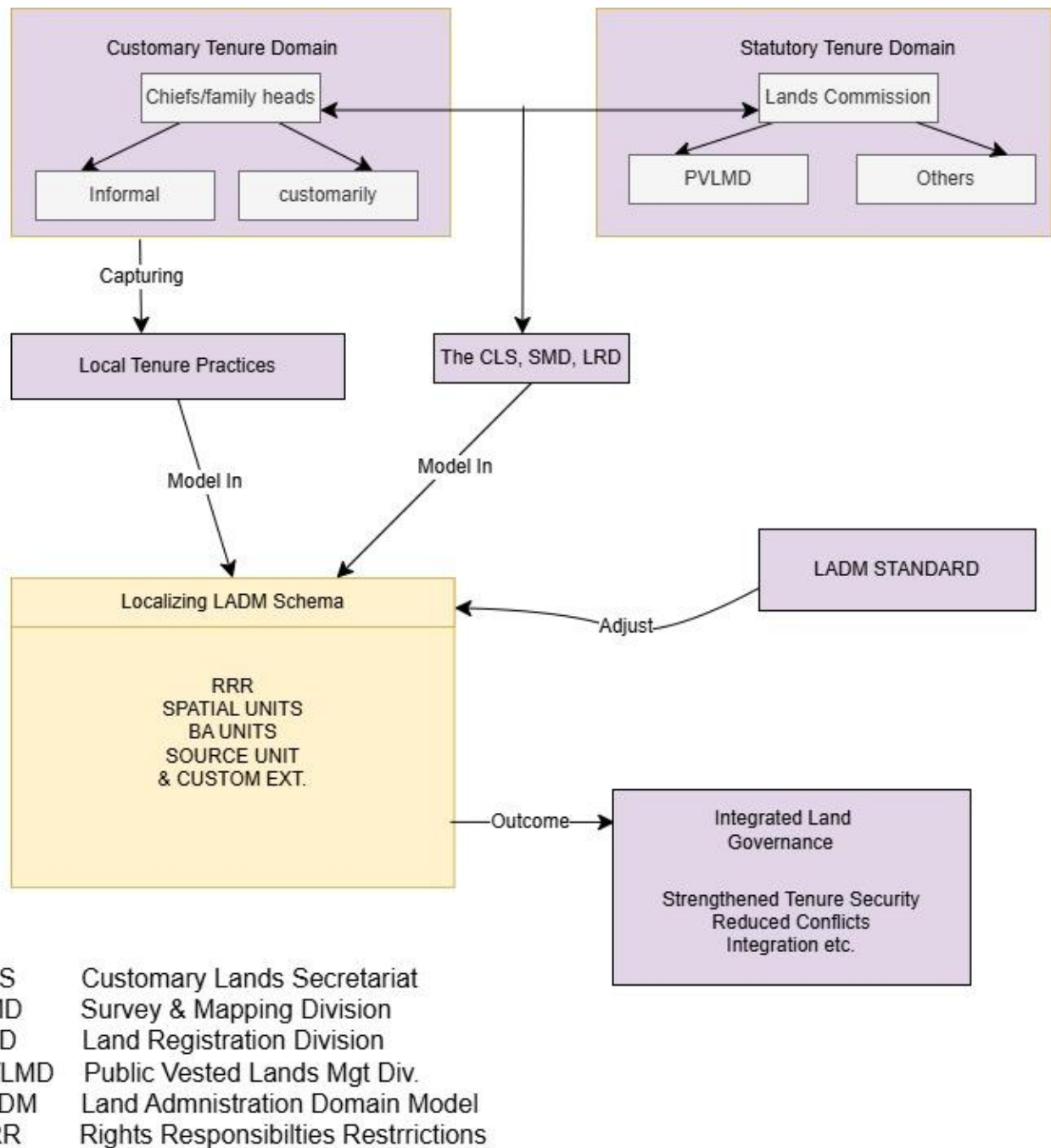


Figure 1 The Conceptual Framework Diagram

### 1.5. Thesis structure

The rest of this thesis is organized into Chapter 2 reviews literature on land governance and LADM. Chapter 3 outlines the research methodology and design approach. Chapter 4 presents the study area and key empirical findings for objectives 1 and 2. Chapter 5 details the development and validation of the localized LADM-based model for objectives 3 and 4. Chapter 6 & 7 concludes the study with key insights, contributions, and recommendations.

## 2. LITERATURE REVIEW

This chapter presents a critical review of the literature on land governance, customary and statutory land tenure, and the development of data models to support integrated governance in complex contexts. It is organized into six interrelated sections. Section 2.1 examines global and African land governance challenges, highlighting the limitations of formal systems in addressing the realities of tenure diversity and rapid urbanization, particularly in Sub-Saharan Africa. Section 2.2 introduces the theoretical frameworks underpinning modern land administration, with emphasis on the continuum of land rights and critiques of top-down governance models. Section 2.3 talks about land tenure, Section 2.4 explores the nature of dual land tenure systems in Africa, focusing on customary institutions, informality, and implications for tenure security. Section 2.5 contextualizes these themes within Dome, a peri-urban area of Accra, Ghana, illustrating the socio-cultural complexity and conflict-prone nature of customary land governance under urban pressure. Section 2.6 provides an in-depth discussion of the Land Administration Domain Model (LADM), including its structure, country profile adaptations, and relevance to Ghana. Section 2.7 synthesizes regional and international case studies (Kenya, Namibia, Uganda, Nigeria) to distil lessons for the localization of LADM in contexts like Dome. The chapter concludes with a critical synthesis that identifies gaps in current models and justifies the need for a localized, socially informed adaptation of LADM to support integrated land governance in Ghana.

### 2.1. Global and African Land Governance Challenges

Globally, land governance is facing increasing pressure from rapid urbanization, rising land values, and complex tenure realities. More than half of the world's population lives in cities, and this figure is expected to reach 68% by 2050 (UN-Habitat, 2022). Much of this growth is occurring in developing countries, where urban expansion often outpaces formal planning mechanisms, leading to widespread informal settlements. These settlements, typically unrecognized by statutory land governance, house over 1.1 billion people who lack secure land tenure, leaving them vulnerable to evictions, marginalization, and land-related conflicts (UN-Habitat, 2020; World Bank, 2022).

A persistent challenge in these contexts is the gap between people-to-land relationships on the ground and what is recognized by formal land administration. Globally, only about 30% of land rights are formally documented (Metaferia et al., 2022). This means that most landholders, particularly in the Global South, live under informal or customary arrangements that are not legally recognized. This documentation gap undermines tenure security and inhibits equitable access to land, especially for the urban poor and marginalized groups (Joannides, 2023; Okyere et al., 2021).

In Sub-Saharan Africa, the challenge is further intensified by legal pluralism, where statutory land governance coexist with customary land governance. In many African countries, customary authorities such as chiefs, family heads, and community elders are responsible for land allocation and dispute resolution. However, these arrangements are rarely documented in official registries, leaving landholders with limited legal protection and opening the door to multiple claims, boundary disputes, and opportunistic land grabbing, particularly in peri-urban areas experiencing high land pressure (Chimhowu, 2019; Buehren et al., 2017).

Formal land governance in Africa have struggled to effectively incorporate these customary practices. Despite legislative efforts to recognize customary rights such as Uganda's Certificates of Customary Ownership (CCOs) and Kenya's Community Land Act, implementation remains uneven. In many cases, statutory procedures are bureaucratic, expensive, and inaccessible to rural and peri-urban populations (GLTN, 2022). As a result, informal land markets flourish outside state regulation, creating opaque systems prone to fraud and elite capture.

Ghana's experience reflects these broader trends. Projects such as the Land Administration Project (LAP) aimed to digitize and modernize the land sector through means such as, the Ghana Enterprise Land Information System (GELIS). However, recent audits reveal that over 80% of land transactions exceed the legal processing timeframe, averaging more than one year in some cases (Ghana Audit Service, 2023). Delays, lack of transparency, and insufficient public awareness continue to hinder trust in formal land governance. Consequently, many citizens

prefer to engage with customary mechanisms even if undocumented, due to their social legitimacy, speed, and cultural familiarity (Okyere, 2021; Asafo, 2020).

At the policy level, frameworks like the Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) and the Sustainable Development Goals (SDGs), particularly Indicator 1.4.2, emphasize the importance of inclusive tenure security that recognizes both formal and informal rights. However, top-down titling efforts alone have proven insufficient in achieving tenure security or preventing displacement. Scholars such as Alden Wily (2022) and Chimhowu (2019) argue that lasting land governance reform in Africa must move beyond legal formalization to more integrated approaches that accommodate the social realities of land tenure.

In summary, land governance in Africa is marked by a disconnect between statutory and customary land governance, with informal landholding still dominant but poorly integrated into national land administration frameworks. Urbanization, land commodification, and weak institutional coordination deepens this disconnect. There is a growing consensus that bridging this gap requires innovative, people-centered solutions that combine legal recognition, technological innovation, and participatory practices. The development and localization of flexible data models such as the Land Administration Domain Model (LADM) is increasingly viewed as a helping strategy for achieving integrated, inclusive land governance in this complex environment.

## 2.2. Theoretical Frameworks: Continuum of Land Rights and Governance Models

The evolution of land governance in developing countries has been heavily shaped by theoretical frameworks that attempt to reconcile diverse land tenure practices with formalized, state-recognized structures. One of the most influential paradigms in this regard is the Continuum of Land Rights, developed and promoted by UN-Habitat's Global Land Tool Network (GLTN). This framework challenges the binary classification of tenure as either legal/formal or illegal/informal. Instead, it conceptualizes land rights as existing on a spectrum from informal, undocumented claims to formally registered ownership each legitimate in its own context and capable of being incrementally secured and upgraded (UN-Habitat/GLTN, 2016).

The continuum approach is especially relevant for settings where customary and informal landholding dominates, such as in peri-urban and rural areas of Sub-Saharan Africa. It argues for the recognition and documentation of these rights through *intermediate mechanisms*, such as community certificates, social tenure settings, or localized land records, which can serve as steps toward more formal registration when needed (Simbizi et al., 2016). This perspective aligns with the realities in Ghana, higher percentage of land is held under customary tenure, and where communities often rely on oral traditions and social legitimacy rather than formal titles to affirm land ownership (Okyere, 2021).

The continuum model is not only conceptual but also practical. It underpins tools such as the Social Tenure Domain Model (STDm), a specialization of the Land Administration Domain Model (LADM) designed to document informal and customary rights without requiring full cadastral precision. STDm has been piloted successfully in Uganda, Namibia, and other countries where participatory mapping and community engagement have supported the recognition of rights outside conventional legal procedures (UN-Habitat, 2022). These initiatives demonstrate that a fit-for-purpose approach to land governance one that starts with the existing reality on the ground can be more effective and inclusive than enforcing formalization from the outset (Enemark et al., 2014).

Closely linked to the continuum of rights is the critique of top-down governance models in land administration. For decades, land reform in Africa and beyond has often been driven by centralized efforts to impose formal titling land governance, with the belief that secure legal title would unlock economic potential by transforming land into a commodity. Pioneered by thinkers like Hernando de Soto, this approach has informed donor-backed titling campaigns across the Global South. However, empirical evidence has increasingly challenged its assumptions. Formal titles alone have not consistently resulted in increased credit access, investment, or tenure security particularly in communities where customary systems already offer strong social legitimacy (Chimhowu, 2019).

Critics like James C. Scott (1998) and Liz Alden Wily (2022) argue that such state-imposed style of land governance, often fail because they overlook the complexity and embeddedness of local land practices. Scott's notion of "legibility" explains how governments, in trying to standardize land governance for ease of control and taxation, may erase the nuanced and negotiated nature of local tenure arrangements. In Ghana, the Land Administration Project (LAP) is a case in point. Although it aimed to streamline land documentation and improve security, it has faced criticism for not adequately integrating customary governance or empowering local stakeholders. According to Alhola and Gwaindepi (2024), LAP's limited impact on improving tenure security for informal landholders underscores the limitations of formalization that is not grounded in community realities.

This mismatch between formal governance and local tenure practice often results in parallel structure. Communities continue to rely on customary authorities and informal documentation (like allocation notes from chiefs) even when formal procedures are available. In peri-urban areas such as Dome, where land values are high and disputes frequent, this disconnect can increase conflicts, contribute to land fraud, and fuel the rise of extra-legal enforcement mechanisms such as land guards (Ehwi & Asafo, 2021). These dynamics point to the need for hybrid governance models ones that incorporate both state authority and local legitimacy.

The Fit-for-Purpose Land Administration (FFPLA) model builds on this critique by proposing a pragmatic and scalable framework. Instead of requiring high-cost, high-precision cadastral surveys and centralized bureaucracies, FFPLA emphasizes "good enough" spatial accuracy, low-cost tools, and local participation. It aligns well with the continuum of rights by allowing flexible, incremental formalization (Metaferia et al., 2022). The Framework for Effective Land Administration (FELA), endorsed by the UN in 2019, further supports this shift by calling for people-centred, sustainable, and inclusive land governance that reflect ground realities and support the SDGs.

In the case of Ghana and Dome in particular these frameworks suggest that bottom-up integration is essential. A model that recognizes oral transactions, community validation, and flexible boundaries, and that embeds them within a standardized structure like LADM, holds greater urge for improving land tenure than formal titling alone. The theoretical literature now broadly converges on this point: tenure security is best achieved not by replacing customary land governance, but by interfacing them with formal land governance, using adaptable tools and participatory methods.

### 2.3. Land Tenure.

Land tenure and tenure security are foundational aspects of land management in Sub-Saharan Africa, shaping the socio-economic and cultural fabric of communities. Despite their fundamental role, land tenure practices are highly complex and differ significantly from Western notions of formal, individual ownership. In much of Africa, land tenure practices blend formal, statutory arrangements with customary, community-based practices.

Historically, customary land tenure in Sub-Saharan Africa has been characterized by communal ownership and kinship-based distribution of land. The traditional model is often linked to spiritual and ancestral connections to the land, emphasizing collective rights over individual ownership (Malinowski, 1935); (Scott, 1998). Customary land are governed by local leaders or community elders, who allocate land based on social status, kinship, and collective needs (Malinowski, 1935). This form of land governance provides an inherent form of tenure security by embedding land rights within the social fabric of communities, where members recognize and respect each other's land rights without formal documentation (Simbizi, 2016).

Land tenure under customary land governance, is not merely an economic asset but a central element of cultural identity and social organization. In *The Trobriand Islands* book, Malinowski (1935) underscores that land tenure involves not only legal entitlements but also complex relationships encompassing religious beliefs, community responsibilities, and traditional agricultural practices. Customary tenure thus extends beyond ownership to encapsulate the way land sustains and structures communities.

Tenure security refers to the degree to which landholders feel confident in their rights to occupy and use land without risk of displacement. Traditional tenure security in customary land governance has been informal but

effective, relying on social acceptance and legitimacy rather than formal titles. However, rising land values, urban expansion, and demographic pressures have created challenges for customary land governance, reducing the tenure security of vulnerable groups (Chimhowu, 2019). The evolution of customary tenure practices in response to these pressures, argues that the introduction of neo-liberal reforms has resulted in a “new customary tenure.” This new model is marked by the formalization and commodification of land, creating a divide between those with legally registered rights and those without (Chimhowu, 2018). Chimhowu also notes that the shift towards formalized, market-friendly land tenure is a double-edged sword. While formalization can enhance tenure security by providing legal protection, it also risks undermining communal land rights, leading to increased inequality and social stratification. This evolution reflects a broader trend of neo-liberalism in land policy, where customary practices are increasingly integrated into statutory frameworks, often at the expense of traditional communal values (Simbizi, 2016).

In Sub-Saharan Africa, the coexistence of customary and statutory tenure practices creates a complex and often conflicting land governance landscape. Formal land titles, governed by statutory law, coexist with customary rights, creating ambiguity over land ownership and use rights. This dual land governance can lead to conflicts, as statutory rights are often prioritized over customary claims, particularly in cases of land disputes or expropriation for development projects (Scott, 1998; Meek, 1946). For instance, “Land Law and Custom in the Colonies,” (Meek, 1946) discusses the challenges posed by colonial land policies that sought to formalize land tenure without considering local customs. The imposition of statutory systems often ignored the socio-cultural dimensions of land tenure, resulting in tensions between local communities and the state. Meek’s analysis highlights the need for integrated land governance models that respect both statutory and customary claims, especially in regions where communal land rights play a central role in economic and social stability.

The relationship between tenure security and economic development is well-documented, as secure land tenure can incentivize investment and improve productivity. When landholders feel confident in their rights, they are more likely to invest in land improvements, which can lead to sustainable development and poverty reduction. However, the effectiveness of tenure security in promoting development depends on the inclusivity and adaptability of tenure systems. Simbizi’s (2016) “pro-poor” perspective on land tenure security emphasizes that tenure policies should be accessible to marginalized groups, integrating both legal protection and social legitimacy to address the needs of all landholders. In addition, tenure security impacts the ability of communities to access credit, as land can serve as collateral for loans. However, this benefit is often limited to individuals with formal titles, excluding those under customary tenure. Chimhowu (2018) argues that integrating customary rights into formal frameworks could expand access to credit and investment opportunities, provided that customary values are preserved and not entirely subsumed by statutory regulations.

Land tenure systems in Ghana, particularly in peri-urban areas like Dome, are characterized by a complex interplay between statutory laws and customary practices. This dual framework often leads to conflicts and ambiguities regarding land rights, especially as urbanization increases the value and demand for land. In Ghana, customary tenure is prevalent, with land managed by chiefs and community elders under traditional norms. However, statutory tenure is overseen by formal legal institutions, creating a landscape of legal pluralism that can complicate land governance. Meek’s “Land Law and Custom in the Colonies” (1946) argues that land tenure encompasses more than mere ownership; it reflects a dynamic way of rights, relationships, and responsibilities among various stakeholders, including farmers, labourers, traders, and community leaders. This broader understanding of tenure is crucial for addressing the needs and aspirations of different groups involved in land use and management. For example, farmers require secure access to land for cultivation, while traders may depend on the ability to negotiate land use for commerce, and manufacturers might seek stability for infrastructure development.

The Chieftaincy and Response document underscores how chiefs, traditionally the custodians of communal land, have increasingly taken on roles akin to landlords, often privatizing land to capitalize on rising values in rapidly urbanizing areas like Dome (Akua Anyidoho et al., 2008). This transition is significant because it alters the fabric of land access, transforming it from a communal resource into a commodity. Such a shift can lead to a reconfiguration of power dynamics within communities, often privileging those who can navigate the formal legal procedures over those who rely on customary arrangements. Research by Asafo (2020) highlights that this shift complicates land governance, as chiefs and local authorities sometimes engage in land sales without proper legal documentation. This practice significantly undermines the tenure security of residents, particularly informal settlers who may lack the resources or legal knowledge to secure formal land rights, leaving them vulnerable to displacement (Marfo et al., 2012).

The coexistence of customary and statutory land governance has resulted in what (Barry & Danso, 2014) describe as "fractured tenure landscapes." In these contexts, informal claims, particularly those held by migrants and low-income populations, remain highly insecure. The absence of clear tenure security exposes residents to threats from powerful actors who may employ land guards to assert control, escalating land disputes and perpetuating social inequities in access to land (Bansah, 2017). This situation is reminiscent of the arguments made by James C. Scott in "Seeing Like a State," where he discusses how simplified and legible ways, imposed by the state often overlook the complexities of local practices and relationships. Such oversimplifications can lead to significant disparities in how different groups experience land tenure, further entrenching existing inequalities.

Simbizi et al. (2014), as cited in "Improving Governance of Tenure Security," argue that tenure security in Sub-Saharan Africa necessitates both socio-cultural and legal recognition. However, the flexibility of customary systems in Ghana means that land rights frequently depend on social relationships rather than formal contracts, a situation easily exploited by local elites. This situation reflects Scott's critique of high-modernist planning, which often ignores local knowledge and practices in favor of uniformity and standardization. Aligning customary tenure with statutory frameworks is essential to mitigate these challenges and ensure a more transparent and equitable land administration system (Jansen, 2020).

A balanced approach to land tenure security involves creating hybrid models that incorporate both statutory and customary systems. This model acknowledges the socio-cultural significance of customary tenure while providing legal recognition to strengthen tenure security. Simbizi (2016) advocates for a "continuum of land rights" that recognizes various forms of tenure, from communal rights to individual ownership, as part of a pro-poor policy framework. This approach allows for flexible land governance that respects local customs and provides the legal support necessary for tenure security. Scott (1998) further emphasizes the importance of "legibility" in land governance, arguing that land tenure systems should be transparent and accessible to all members of society. He warns against overly simplified land tenure reforms that disregard local knowledge and practices, as such reforms can lead to unintended social and economic consequences. Instead, land tenure policies should be context-sensitive, respecting the diversity of tenure arrangements that exist within communities.

The implications of these fractured tenure practices, are particularly significant for urban land use planning. Cobbinah et al. (2020), in "Urban Land Use Plan," argue that the conflation of ownership and administrative roles among chiefs has resulted in fragmented urban development in Ghana, particularly in peri-urban zones. Chiefs who oversee customary land sometimes bypass zoning laws and statutory requirements, leading to unplanned settlements lacking essential infrastructure and planning oversight. This unregulated urban growth not only disrupts land markets but also places informal settlers and low-income groups at greater risk of eviction, especially as demand for land intensifies (Cobbinah et al., 2020).

## 2.4. Customary and Statutory Land Tenure in Ghana: Complexities in Peri-Urban Dome

Statutory tenure is governed by formal laws, regulations, and land institutions such as the Lands Commission, while customary tenure prevalent over approximately 70–80% of Ghana's land, is rooted in unwritten traditions and practices overseen by traditional authorities like chiefs and family heads (Okyere, 2021; Buehren et al., 2017). This duality is especially visible in peri-urban areas like Dome, where rapid urbanization places increased pressure on customary land systems, resulting in complex and often contentious land relations.

Customary tenure in Dome typically used to rely on communal ownership and inheritance-based distribution. Land is allocated through oral agreements, lineage authority, and community recognition rather than formal documentation. These practices, while socially legitimate and long-standing, often lack legal backing, rendering many landholders vulnerable to eviction or land loss in the face of competing claims or urban development projects (Anyidoho et al., 2008; Simbizi et al., 2014). Chiefs, who traditionally act as custodians, have increasingly assumed roles akin to landlords. As land values rise, some chiefs and family heads have capitalized on the market by selling communal land to private developers sometimes without the consent of all stakeholders, further fragmenting the tenure landscape (Asafo, 2020).

This fragmentation is particularly pronounced in Dome, where land sales are frequently conducted without survey plans, signed indentures, or land commission registration. Families often experience internal disputes when individual members sell shared land secretly, resulting in conflicting claims. Such sales, grounded in customary arrangements, rarely meet statutory requirements, making them difficult to register formally. Consequently, overlapping claims, mistrust, and even the use of "landguards" to assert control over disputed property have emerged as coping mechanisms in the absence of effective dispute resolution (Ehwi & Asafo, 2021).

The coexistence of these systems has created what Barry and Danso (2014) describe as "fractured tenure landscapes", areas where informal claims are widespread but remain insecure due to lack of statutory recognition. Migrants, informal settlers, and low-income groups are disproportionately affected. In these environments, the inability to reconcile customary and statutory claims leads to significant tenure insecurity, undermining both social cohesion and formal land governance.

Furthermore, legal attempts to formalize land rights have often failed to sufficiently engage or integrate customary institutions. The Land Administration Project (LAP), for instance, aimed to digitize and streamline land services but fell short in securing customary claims or clarifying overlapping tenure systems (Alhola & Gwaindepi, 2024). Despite policy advances such as the Land Act, 2020, implementation challenges remain due to institutional fragmentation, high transaction costs, and public mistrust of formal procedures (Okyere, 2021).

Efforts to harmonize the dual land governance, have led to initiatives such as the establishment of Customary Land Secretariats (CLSs), intended to document land transactions within the customary domain. While promising, studies reveal that these bodies often lack capacity, funding, and legal authority to bridge the gap meaningfully (Simbizi et al., 2014; Marfo et al., 2012). Moreover, they frequently mirror the elite capture observed in chieftaincy systems, excluding marginalized groups like women or migrants from land governance processes (Barry & Kingwill, 2020).

In Dome, this duality results in a paradox: statutory institutions expect proof of ownership through documentation, while most landholders operate under oral or semi-formal customary arrangements. The result is a large-scale documentation gap and growing tension between community norms and state requirements. As Chimhowu (2019) notes in his discussion of "new customary tenure," this system is not static, it is evolving under pressure from market forces, legal reforms, and urban expansion.

To address these challenges, scholars and practitioners increasingly advocate for hybrid tenure models that align with the continuum of land rights framework. These models aim to document and gradually formalize existing legitimate landholdings without undermining customary authority. In this context, tools such as the Land Administration Domain Model (LADM) and Participatory GIS (PGIS) have been proposed as means to map, digitize, and harmonize customary claims in a form acceptable to statutory institutions (Joannides, 2023; Salifu et

al., 2019). These approaches offer a path toward inclusive, locally grounded tenure systems, particularly relevant in peri-urban zones like Dome where both customary and statutory regimes must co-exist.

## 2.5. Tenure Security, Conflict Reduction, and Dispute Resolution

Land tenure insecurity is a well-documented driver of land-related conflict across Sub-Saharan Africa, and Ghana is no exception. Historically, statutory and customary systems evolved on separate tracks, resulting in poor coordination and gaps in enforcement (Chimhowu, 2019; Asaaga, 2021). One consequence is the prevalence of protracted land litigation: formal courts in Ghana are overburdened with thousands of land cases, many dragging on for years, reflecting the difficulty of resolving disputes within the bifurcated system (Ubink, 2008; Asaaga, 2021). Tenure insecurity, such as undocumented customary holdings or unclear boundaries, fuels these conflicts. Wehrmann (2008) notes that many land conflicts arise from multiple sales of the same parcel and double allocations of land, enabled by the lack of documentation and the existence of parallel legal regimes. In peri-urban areas like Dome where urbanization pressures meet customary landholding, such challenges are acute: informal sales and family-based arrangements dominate, creating an environment where disputes are frequent and often complex in nature (Ubink, 2008; Arko-Adjei, 2011). The informality of tenure in these areas means that different actors (chiefs, family heads, state agencies) may all claim authority, heightening the potential for conflict when land values rise, or ownership is contested.

Strengthening tenure security is widely seen as a key strategy to reduce land disputes. The logic is straightforward, when land rights are clearly defined, acknowledged, and protected, there is less room for overlapping claims or exploitation of ambiguities. Empirical evidence from various African contexts shows that formal documentation of land rights can significantly lower the incidence of disputes by clarifying ownership and boundaries (Lawry et al., 2017). In Ethiopia and Rwanda, for example, systematic land registration and certification programs led to notable declines in boundary conflicts and related litigation (Ali et al., 2014). In Ghana, efforts to enhance tenure security have focused on bridging the customary-statute divide rather than eliminating it. Early land administration reforms often assumed that converting customary tenure to individualized titles would solve conflicts by creating certainty (Asaaga, 2021). Indeed, Ghana's post-colonial policies tended to promote Western-style titles as the antidote to "insecure" customary arrangements (Kasanga & Kotey, 2001; Bromley, 2008). However, the outcomes of such wholesale formalization have been mixed. Research suggests that poorly implemented titling can inadvertently *heightens* conflicts or inequities, especially when it disregards local norms (Bromley, 2008; Chimhowu, 2019). Formal title deeds alone do not guarantee perceived tenure security if they are out of touch with social realities on the ground. As a result, there has been a paradigm shift toward approaches that strengthen tenure security in inclusive ways, recognizing and formalizing legitimate customary rights, improving record-keeping, and providing accessible avenues for resolving disputes, all of which can reduce conflict without upending local tenure systems (Chimhowu, 2019). In peri-urban Dome, this means acknowledging family and clan land rights as valid and worthy of protection, even if they do not currently exist in the state registry. By documenting such rights or at least mapping and publicizing them, landholders gain confidence that their interests will be respected, which in turn disincentivizes opportunistic challenges and multiple sales that spark conflict (Arko-Adjei, 2011). Simply put, when people *feel secure* in their land rights, they are less likely to resort to confrontational means (like engaging vigilante "landguards" or rushing to court) to defend those rights.

Equally important to conflict reduction is the strengthening of local dispute resolution mechanisms. In Ghana, customary authorities (chiefs, clan heads, family elders) have traditionally been the first resort for resolving land disagreements within communities. Even today, studies indicate that most people prefer customary forums over the formal courts for land dispute resolution, Asaaga (2021) found that over 90% of respondents in two rural Ghanaian study areas turned to traditional mechanisms rather than state courts. This preference stems from several



factors: local forums are more accessible, faster, conducted in familiar languages, and tend to carry greater social legitimacy among community members.

However, customary dispute resolution on its own faces' challenges, including bias or power imbalances (e.g., towards men or elites) and the lack of formally enforceable outcomes. To address these issues and integrate the strengths of both systems, Ghana's recent policy reforms explicitly promote Alternative Dispute Resolution (ADR) and hybrid mechanisms. Notably, the new Land Act, 2020 (Act 1036) mandates that any land dispute should first be subjected to ADR processes before it can be taken to court (Republic of Ghana, 2020; Lands Commission, 2023). This legal backing for mediation, negotiation, and arbitration encourages parties to seek mutually acceptable solutions at the community level, ideally reducing the load on the courts and leading to faster, less acrimonious settlements. ADR approaches in land matters often involve a blend of customary and formal practices, for instance, a mediation committee may include local chiefs or elders as well as a representative of the Lands Commission or a trained mediator. By formalizing the requirement for ADR, the state is essentially empowering customary and local institutions to handle disputes, while retaining oversight. Early indications suggest that this approach can help de-escalate conflicts: disputes resolved through mediation tend to preserve social relationships and cost less time and money than litigation (Bugri, 2012).

Furthermore, Ghana's Land Act formally recognizes Customary Land Secretariats (CLSs) as part of the land governance framework (Republic of Ghana, 2020). These secretariats, first piloted under the Land Administration Project, serve as local land offices for traditional authorities, recording land transactions, keeping maps and registers, and often acting as a first port of call for dispute claims within the community. The institutionalization of CLSs (now legally required for all major landowning stools or skins) is intended to bring record-keeping and dispute resolution closer to the source of conflicts (COLANDEF, 2021). A well-functioning CLS provides a transparent paper trail of land allocations and sales, which helps prevent the notorious problem of one plot being sold to multiple buyers. It also creates a formal interface where aggrieved parties can lodge complaints and seek redress under the guidance of customary leaders who are operating with support from the state.

In peri-urban settings like Dome, where informal land sales are common, the presence of a local secretariat or committee to document transactions and mediate disagreements can significantly curb the eruption of disputes. By blending customary authority with basic administrative capacity (e.g. record books, file systems, trained staff), CLSs exemplify how localized dispute resolution can be strengthened to reduce conflict.

A recurring theme in the literature is that integrating formal and customary systems is essential for both tenure security and conflict reduction. Rather than viewing state and customary land tenure regimes as mutually exclusive or inherently in conflict, recent policy thinking treats them as complementary. Chimhowu (2019) observes that several African countries, including Ghana, have made progress by formally integrating customary tenure within national land administration frameworks. This includes legal recognition of customary land rights and adjudicatory bodies, and procedural links between customary decisions and state enforcement.

The guiding principle is to leverage the social legitimacy and local knowledge of customary institutions while upholding overarching standards of fairness and consistency from the formal system. The Continuum of Land Rights framework has been influential in this regard. Championed by UN-Habitat and the Global Land Tool Network, the continuum concept posits that a range of tenure forms, from informal and customary use rights, through occupancy certificates, to full titles, can coexist and be progressively formalized (UN-Habitat, 2008). Rather than a binary view of land as either formally owned or not, it recognizes a spectrum of legitimate rights. Each step along the spectrum can confer increasing levels of recognition and protection, thereby improving tenure security without immediately requiring freehold title for all (UN-Habitat, 2008; Zevenbergen et al., 2013).

In practice, this might mean that a family in Dome with ancestral land, but no official title could be issued an interim document (e.g., a customary land certificate or a recorded allocation note) that acknowledges their claim. Such recognition, even if short of full title, often provides enough security to discourage encroachment or multiple sale of the same land. By formalizing the informal in incremental ways, the continuum approach helps to legitimize customary rights and reduce the sense of legal vacuum that breeds conflict. Ghana's land policy environment reflects this thinking: customary landholders are no longer seen as "squatters" on state land but as rightful stakeholders whose interests can be recorded and eventually upgraded in the formal registry (Arko-Adjei, 2011; Chimhowu, 2019). This integration of systems, combining the flexibility and cultural relevance of customary tenure with the uniform protection of statutory law, is posited as a sustainable route to minimize land disputes in fast-changing peri-urban areas. It ensures that as areas like Dome transition from rural to urban, the rights of long-standing inhabitants are not swept aside (which often causes resistance and conflict) but rather are incorporated into the new urban land governance regime.

Enhancing tenure security, through recognizing customary rights and improving documentation, lays the groundwork for fewer conflicts. At the same time, investing in effective dispute resolution mechanisms (ADR, empowered local institutions) ensures that when conflicts do occur, they do not spiral into violence or interminable litigation. Bridging customary and formal systems is the thread that ties these goals together. As the case of Dome illustrates, a hybrid approach that blends local legitimacy with formal structure is essential. By positioning this theme at the nexus of social tenure systems and technical land administration modeling, we see that good tenure governance is not just about drafting regulations or software, but about resolving real human disputes and preventing new ones

## 2.6. The Role of LADM and Country/Local Profiles

The Land Administration Domain Model (LADM), standardized as ISO 19152, has emerged as a powerful global framework for structuring and harmonizing land governance. Developed to address the limitations of rigid cadastres, LADM enables the formal documentation of both statutory and non-statutory tenure arrangements supporting a spectrum of rights, responsibilities, restrictions, spatial units, and legal parties (Lemmen et al., 2011; Oosterom et al., 2019). Central to its value is its ability to represent *formal, informal, and customary* land arrangements within a single extensible data structure, aligning well with the "continuum of land rights" approach promoted by UN-Habitat.

By abstracting tenure into generalized classes (e.g., LA\_Party, LA\_RRR, LA\_SpatialUnit), LADM creates an interoperable framework that can be extended through country profiles, customized implementations that reflect national legal, institutional, and social contexts (Kalogianni et al., 2021). These profiles ensure compatibility with local land governance while benefiting from international standards. For instance, Kenya's LADM profile integrates gender-specific rights, community land holdings, and seasonal land use practices to align with its 2016 Community Land Act (Okembo et al., 2022). Similarly, Namibia's Flexible Land Tenure System (FLTS) integrates starter titles and communal land records within a simplified LADM-inspired system (Tjia & Coetzee, 2014).

Ghana has yet to fully implement a national LADM profile, despite digitization efforts such as the Ghana Enterprise Land Information System (GELIS) and the Land Act 2020, which supports electronic conveyancing. However, Okyere, Zevenbergen, and Lemmen (2021) conducted a requirements analysis that outlines the foundations for a Ghanaian LADM profile, recommending the integration of statutory, deeds, customary, and informal land governance. These efforts could serve as the foundation for local extensions sub-country profiles, that address place-specific dynamics such as those in Dome, where informal allocations, oral transactions, and family-based land governance dominate.

A localized LADM profile for Dome would allow for structured recording of diverse tenure relationships, including overlapping rights, inheritance customs, and unregistered family claims. By customizing existing LADM classes (e.g., introducing subtypes like "CustomaryAllocation," or "OralAgreement"), the model can bridge local

realities with national systems. Moreover, the integration of participatory tools such as PGIS and STDM developed by UN-Habitat as a community-friendly adaptation of LADM could enhance local legitimacy and ensure that undocumented land claims are captured, mapped, and gradually formalized (Joannides, 2023).

## 2.7. Case Studies: Kenya, Namibia, Uganda, Nigeria

Numerous African countries have begun adapting the LADM to address the realities of plural land tenure systems, offering critical lessons for Ghana.

Kenya provides a robust example. Following its 2010 Constitution and subsequent land laws, the country developed a national LADM profile to include community land rights, gender equity, and seasonal use by pastoralists (Okembo et al., 2022). The system allows polygamous households and communal rights to be explicitly documented, reflecting social realities that conventional cadastres would otherwise overlook. Moreover, Kenya's Ardhisasa digital platform exemplifies how an LADM-based system can support transparent, user-centered land administration. Ghana, with its 2020 Land Act, is in a similar position to localize and implement such a model, especially for customary land.

Namibia's Flexible Land Tenure System (FLTS) presents another innovative approach. It introduced legally recognized titles such as the "Starter Title" and "Land Hold Title" for informal settlements, offering a pathway for tenure upgrade and integration into the national registry. These titles were implemented through decentralized land offices while remaining legally supervised by the national deeds office (Tjia & Coetzee, 2014). Community participation played a central role, ensuring that documentation reflected the lived realities of residents. Ghana's Customary Land Secretariats (CLSs) could adopt a similar structure, combining community-level documentation with LADM-based digital interfaces.

Uganda demonstrates how legal reform, and technological innovation can work together. With over 80% of land under customary tenure, Uganda recognized these rights via *Certificates of Customary Ownership (CCOs)*. These certificates developed using participatory mapping and STDM tools are now being digitized and integrated into the national Land Information System (GLTN, 2021). This model highlights the potential for grassroots documentation to form the basis of nationally recognized tenure, a pathway highly relevant for Dome.

Nigeria's experience underscores the risks of fragmented governance. The country's federal structure has led to inconsistent land records and weak planning coordination. A 2024 evaluation in southeast Nigeria recommended adopting the LADM to standardize and modernize land data structures (Azie et al., 2024). The Nigerian case illustrates that without harmonization; even advanced legal frameworks fail to resolve conflicts or improve tenure security. Ghana's relative centralization under the Lands Commission provides a strategic opportunity to implement an integrated LADM-based system that includes customary tenure.

Across these case studies, a clear trend emerges successful integration of customary tenure requires legal recognition, technical standards, and strong community engagement. A localized LADM profile for Dome can draw directly from these insights ensuring flexible representation of informal claims, interoperability with national systems, and participatory validation by residents.

In summary, these gaps validate the need for a localized LADM profile for Dome. Such a model would function not only as a technical tool but also as a bridge between customary realities and formal governance, providing clarity, legitimacy, and inclusion. It can serve as a scalable blueprint for similar peri-urban areas across Ghana and beyond.

### 3. METHODOLOGY

#### 3.1. Study Area and Justification

Dome, located in the Ga East Municipal District of the Greater Accra Region, serves as a critical study area for examining land tenure security issues amidst rapid urban expansion and complex land tenure dynamics. With a population of approximately 78,785 in 2012, Dome is the nineteenth-largest settlement in Ghana, yet recent voter registration figures for the 2024 election indicate a significant increase, with 172,907 registered voters. (Wikipedia, 2024) (Electoral Commission, 2023). This rapid growth underscores the influx of new residents seeking affordable housing near Accra, heightening the pressure on Dome's land and exposing the limitations of its current land administration systems

The land tenure situation in Dome is characterized by a dual legal system where statutory law intersects with customary land practices, creating confusion and tenure insecurity. According to Boamah and Walker (2017), this pluralistic system often leaves residents, particularly low-income households, vulnerable due to inadequate land registration processes and high registration costs. Many landholders' resort to informal land arrangements as they find formal bureaucratic processes overwhelming and expensive, contributing to a general distrust in the formal land administration system. This reliance on informal arrangements leads to increased tenure insecurity as individuals lack legal documentation to defend their claims

Dome has also become a focal point for land disputes and incidents involving land guards, who are often hired to assert or protect contested land claims violently. A recent attack in the Dome Pillar Two area, for instance, left over 60 residents, including vulnerable groups such as children and pregnant women, displaced after armed land guards destroyed their homes. This incident, rooted in a protracted ownership dispute, highlights the physical insecurity that Dome residents face when traditional and legal claims to land clash. Despite police intervention, such acts of vigilantism persist, deepening the tenure insecurity that pervades Dome and demonstrating the urgent need for clearer, legally recognized land rights (ADR News, 2022)

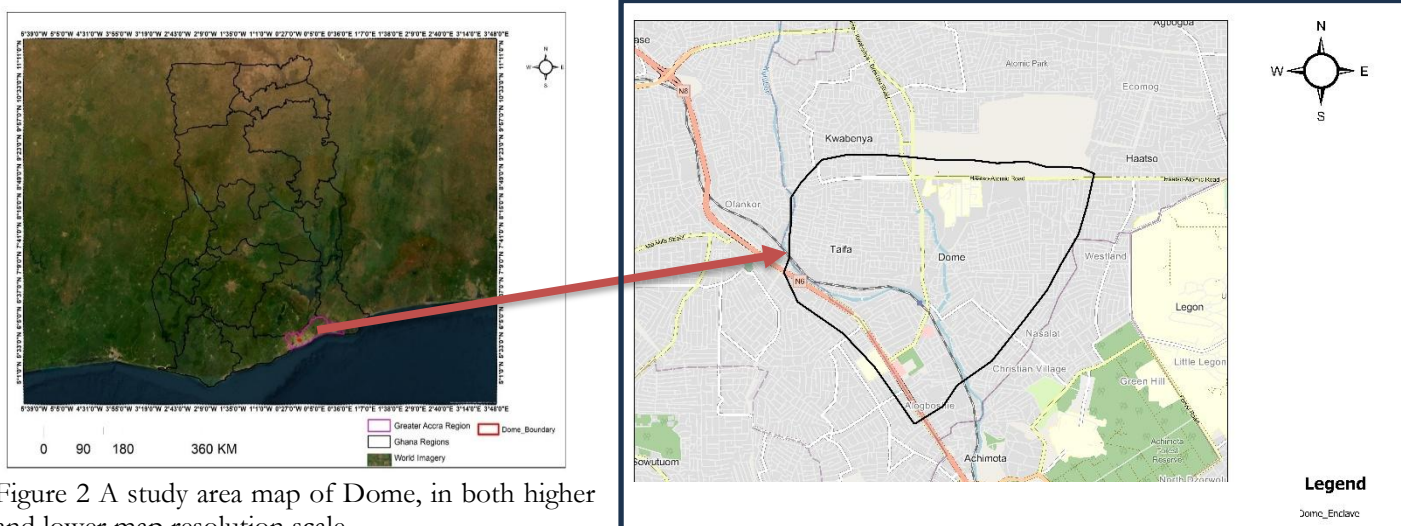


Figure 2 A study area map of Dome, in both higher and lower map resolution scale

#### 3.2. Research Design

This study adopted a qualitative and design-based research approach, in alignment with the framework proposed by Rossiter (2019), to explore the complex and context-specific nature of land tenure systems in Dome, Ghana. The research was carried out in three distinct phases: the pre-field phase, the fieldwork phase, and the post-field analysis phase.

The pre-field phase involved a comprehensive literature review, the formulation of research objectives and questions, the development of interview guides, and the identification of key stakeholders. This phase was crucial in shaping the conceptual framework and ensuring that the study was grounded in both theoretical and contextual relevance.

The fieldwork phase consisted of primary data collection through interviews, focus group discussions (FGDs), and key informant engagements with residents, customary authorities, land sector professionals, and institutional stakeholders. A purposive and snowball sampling approach was used to reach diverse respondents, including women, tenants, family heads, and officials from the Customary Land Secretariat and Lands Commission.

The post-field phase involved the transcription and analysis of qualitative data using Atlas.ti software. The findings were coded and organized thematically based on the study's sub-objectives. Additionally, the Land Administration Domain Model (LADM) was adapted to reflect the local tenure conditions observed in Dome. The proposed model was subjected to stakeholder validation through review sessions, allowing for real life scenario evaluation of its feasibility, accuracy, and alignment with Ghana's land governance systems.

### **Design Science Research Approach**

This study adopts a Design Science Research (DSR) methodology (Hevner et al 2004) to develop a localized land administration model grounded in both formal land governance and customary tenure practices in Dome, Ghana. DSR is appropriate for studies that aim to solve real-world problems through the design and validation of practical artifacts (Hevner et al., 2004; Peffers et al., 2007). In this context, the “artifact” is a conceptual model based on the Land Administration Domain Model (LADM), tailored to integrate the complex tenure environment of Dome.

According to Peffers et al. (2007), DSR follows a structured process involving:

1. Problem identification: Recognizing persistent land tenure insecurity and the gap between statutory and customary land systems.
2. Objective definition: Establishing the goal of developing a locally valid, socially grounded model that enhances land documentation and governance.
3. Artifact design and development: Creating a conceptual model based on LADM, using field data from interviews, FGDs, and document reviews.
4. Demonstration: Illustrating how the model represents key tenure relationships and supports integrated documentation.
5. Evaluation: Engaging domain stakeholders to validate the model's relevance, completeness, and feasibility.
6. Communication: Presenting findings and the final model through this thesis and potential future policy channels.

This methodological structure ensures that the research proposes a solution that is not only theoretically informed and empirically grounded but also practical and implementable within the context of land governance in Ghana.

### **3.3. Pre-fieldwork**

In the pre-fieldwork phase, the study focused on defining clear objectives and research questions to guide the development of an LADM-based model for enhancing land tenure security in Dome, Accra. A comprehensive literature review identified gaps in existing models and informed the structure of a localized LADM profile, drawing on lessons from similar contexts (Creswell & Plano Clark, 2011). Relationships were established with key stakeholders, including customary leaders, community representatives, and land officials, to ensure the model reflects both statutory and customary governance needs. Interview guides were then developed to capture qualitative data on tenure experiences, documentation challenges, and barriers to secure land rights. This phase provided the necessary foundation, tools, and stakeholder support for the fieldwork.

### 3.4. Fieldwork (data collection)

This section outlines the data collection activities undertaken to understand land tenure arrangements and governance practices in Dome. A combination of purposive and snowball sampling strategies was used to engage a diverse group of stakeholders. Qualitative methods, including interviews, focus group discussions, and document review, were employed to capture both institutional and lived experiences relevant to local land management and the adaptation of LADM.

#### 3.4.1. Sampling Strategy:

A purposive sampling approach was used to select knowledgeable participants who could provide rich information on land tenure practices in Dome. This strategy ensured that key stakeholder groups (e.g., local chiefs, landlords, land officers) were included based on their expected insight into the topic (Palinkas et al., 2015). Additionally, snowball sampling was employed to reach informants through referrals; for instance, an interviewed community leader might introduce the researcher to other elders or knowledgeable residents. This combined purposive and snowball technique is common in qualitative land tenure studies to access hard-to-reach experts and community insiders (Naderifar et al., 2017). Past land tenure research in Ghana has successfully used similar non-probability sampling to gather diverse perspectives on customary and statutory systems (Arko-Adjei, 2011).

#### 3.4.2. Participants and Sample Size:

Using the above strategy, 29 participants were recruited. This sample encompassed a broad range of stakeholders, ensuring multiple viewpoints on the land tenure system in Dome. Semi-structured interviews are well-suited for land tenure research because they enable probing into personal narratives and complex social practices (Kvale & Brinkmann, 2009). The participants included

- i. Residents/Landholders (10): Ordinary community members and family members who hold or use land (6 men and 4 women).
- ii. Residents/Tenants (10): community members who get rentals or leases from the landlords (both men and women)
- iii. Traditional Authorities (4): Chiefs, family clan heads, and principal elders familiar with customary land allocation and history.
- iv. Land Administration Officials (1): Personnel from the Lands Commission (e.g., senior lands officers, the land title registration officer)
- v. Customary land secretariat (1): For the Nii Sempe Family Stool lands, who are representative of the dome family lands.
- vi. Technical Experts (2): Senior Geoinformatics specialists, the Land Information service department head, and planners with experience in land mapping from Accra Lands Commission.
- vii. Legal Expert (1): Another senior legal and policy expert personnel from the Ghana Lands Commission legal services department.

In qualitative research, the goal is thematic saturation, the point where no new insights emerge (Guest et al., 2006). Prior studies suggest that 20–30 interviews can yield rich data when participants are knowledgeable, and the topic is focused. Given. Snowball sampling approach, sample size was used, and the diversity of respondents ensured strong information power, supporting the depth and reliability of findings (Palinkas et al., 2015).

#### 3.4.3. Data Collection Methods:

3 Qualitative data collection techniques were utilized to gather comprehensive information on land tenure dynamics:

- i. Semi-Structured Interviews - 18: Nineteen one-on-one interviews were conducted using open-ended questions on land ownership, registration, customary practices, and perceptions of LADM. Each session lasted 30–40 minutes and was often conducted in the local language with translation when needed (Yin, 2014).
- ii. Focus Group Discussions (FGDs) - 10: Two FGDs were held with tenants, youth, men, and women, to explore shared experiences on leasing and tenancy. The group format encouraged open discussion and helped clarify community norms (Krueger & Casey, 2015; Abdulai, 2024).
- iii. Historical Narratives & Document Review - 1: A community elder recounted the evolution of land ownership in Dome, while documents such as family land records and maps were reviewed to contextualize current tenure systems. This triangulation helped identify key customary elements for the LADM model.

Data was collected over four weeks in Dome, following ethical protocols, including informed consent and confidentiality. The mixed-method approach provided both individual and collective insights into land tenure dynamics.

### 3.5. Post-field phase

Following data collection, the post-field phase involved systematic organization, analysis, and conceptual modeling of the empirical data. This phase included transcription and thematic coding using ATLAS.ti, as well as the development of a localized LADM-based conceptual model. The process ensured that field insights were rigorously analyzed and directly translated into model components that reflect Dome’s hybrid land tenure context.

#### 3.5.1. Transcription and Data Management:

Upon completion of fieldwork, all audio recordings from interviews and focus groups were transcribed verbatim. The transcripts (along with field notes and relevant documents) were imported into ATLAS.ti qualitative analysis software for organized coding and analysis. ATLAS.ti facilitated efficient management of the large volume of textual data. Each transcript was labeled with metadata (e.g., participant role, date) and stored in the project database (Frieze, 2014). Using a Computer-Assisted Qualitative Data Analysis Software (CAQDAS) like ATLAS.ti improves transparency and rigor by systematically keeping track of codes, annotations, and linkages across transcripts (Paulus & Lester, 2016, as cited in Frieze, 2014).

#### 3.5.2. Coding Process:

Thematic analysis was conducted using ATLAS.ti, guided by Braun & Clarke (2006). The researcher first familiarized with the data by repeatedly reading the transcripts. Initial coding combined inductive themes from the data and deductive categories aligned with research objectives and LADM concepts. Codes such as “Dispute Resolution,” “Informal Sale,” and “Customary Practice” were applied to relevant segments. Emergent themes like “Trust in Institutions” were also captured. Analytic memos were used to link insights with LADM elements (e.g., identifying “family head” as a Party class). This process ensured structured yet flexible interpretation of the data.

#### 3.5.3. Theme Development:

After coding, related codes were grouped into broader themes using ATLAS.ti tools like code families and network diagrams. For example, “Chief’s consent,” “Family land allocation,” and “Oral agreements” were grouped under *Customary Land Tenure Practices*, while “Title registration,” “Survey and mapping,” and “Land Commission delays” formed *Formal Land Administration Issues*. Themes aligned with research questions and core LADM components to support model development. Key themes included *Actors in Land Tenure*, *Types of Rights and Tenure*, *Land Units and Boundaries*, and *Administrative Challenges*, corresponding to LADM classes like Parties, RRRs, and Spatial Units.

Thematic analysis ensured that field insights were systematically organized and traceable, forming a clear foundation for the model (Braun & Clarke, 2006; Nowell et al., 2017).

### 3.5.4. Conceptual Modelling Process and LADM Adaptation

This section describes the structured process used to develop the conceptual model based on the Land Administration Domain Model (LADM) (ISO 19152). The model was created to reflect the hybrid land tenure context of Dome, integrating both statutory and customary land rights and incorporating informal and undocumented practices.

### 3.5.5. Modelling Approach and Tools

The model was developed using Unified Modeling Language (UML) class diagrams, which are recommended by the ISO 19152 standard for representing LADM-based models (Lemmen et al., 2012). Architect Enterprise was used for drafting class diagrams due to its support for collaborative, iterative model development. Each class corresponds to key LADM packages Parties, Rights/Responsibilities/Restrictions (RRRs), Spatial Units, and Administrative Sources adapted to the realities of land transactions and governance in Dome.

### 3.5.6. Field-Driven Class Identification and Mapping

Thematic findings from the field were directly mapped to the LADM conceptual schema:

- i. LA\_Party captured actors like family heads, stool/clan authorities, tenants, and buyers, with subtypes for individuals, families, and customary institutions.
- ii. LA\_RRR represented tenure types such as oral agreements, inherited rights, and undocumented leases, with customized code lists for local rights.
- iii. LA\_SpatialUnit included formal parcels and informal plots (e.g., “family compound,” “inherited farm”), accommodating approximate or overlapping boundaries.
- iv. LA\_Source was extended to include oral testimonies, allocation notes, sale receipts, affidavits, and family records as legitimate evidence.

### 3.5.7. Class Extensions and Local Adaptation

Several custom attributes and code lists were added to align the LADM schema with Dome’s context:

- Customary party types (LA\_PartyType: chief, family head, tenant).
- Customary right types (LA\_RightType: allodial, usufruct, allocated-use, unregistered sale).
- Modes of evidence (LA\_SourceType: oral testimony, allocation paper, family register, receipt).

Relevant associations (e.g., multiple heirs sharing undivided claims) were modeled as many-to-many relationships, with inheritance captured through recursive links (e.g., father-to-son transfers).

**Iterative Refinement and Traceability:** The modelling process followed a design science cycle preliminary diagrams were created after initial field coding, then tested through expert interviews and refined based on feedback. Each entity and relationship in the final model were traceable to a coded theme from the data, ensuring the conceptual model was empirically grounded and socially validated.

### 3.5.8. Evaluation of the Conceptual Model

To assess the validity, usability, and contextual fit of the localized LADM-based model for Dome, this study adopted a scenario-based evaluation approach, following precedents in land administration model development (Sari, 2023; Enemark & Williamson, 2004)



### 3.5.9. Evaluation Goals

The goal of this phase was to determine:

1. Whether the conceptual model accurately reflects real-world tenure practices in Dome.
2. If the model is comprehensible and practical for use by land administration stakeholders.
3. What refinements are necessary to improve contextual alignment, legal clarity, and implementation feasibility.

### 3.5.10. Evaluation Framework

A set of evaluation criteria was developed based on ISO 19152 guidelines, LADM validation literature (Lemmen et al., 2012), and best practices from model-based design science (March & Smith, 1995). These include:

Table 1 Evaluation Criterion

Evaluation Criterion	Focus Area
Representational Accuracy	Do entities and relationships correctly represent tenure practices in Dome?
Terminological Fit	Are class labels and definitions understandable and aligned with local terminology?
Completeness	Does the model account for both statutory and customary tenure arrangements, including informal practices?
Practical Feasibility	Can the model be applied in actual land administration workflows?
Legal and Institutional Alignment	Is the model compatible with Ghana's Land Act 2020, customary law, and institutional roles?
Scalability and Transferability	Can the model be adapted to other peri-urban areas with similar tenure patterns?

These criteria guided the formulation of evaluation questions used in expert interviews.

### 3.5.11. Participants

A purposive sample of 19 domain experts was selected based on their familiarity with land tenure systems in Ghana. Participants included, Lands Commission officers (2), Customary Land Secretariat official (1), Legal experts in land tenure and customary law (1), GIS and land information system specialists (1), Family representative with experience in local land governance (2), Resident landlords (6), Tenants (5), Family Chief (1).

### 3.5.12. Evaluation Procedure

Stakeholders were presented and asked to answer a series of questions based on:

- I. Descriptions of key model classes (Party, RRR, Spatial Unit, Source).
- II. Illustrative tenure scenarios drawn from Dome (e.g., inheritance-based family allocations, undocumented sales).

### 3.5.13. Analysis and Incorporation

Stakeholder responses were analysed using qualitative content analysis, organized around the six evaluation criteria. Responses were grouped thematically to identify strengths, areas of confusion, and suggestions for improvement. Feedback was incorporated iteratively:

- I. Suggestions for clearer labels or more locally resonant terminology led to adjustments in class or attribute names.
- II. Missing elements (e.g., certain evidence types or relationship nuances) were added as new attributes or code list entries.
- III. Alignment with policy and institutional structures was ensured through comparison with the Land Act 2020 and CLS guidelines.

All changes were documented in a revision log to ensure transparency and traceability of modifications.

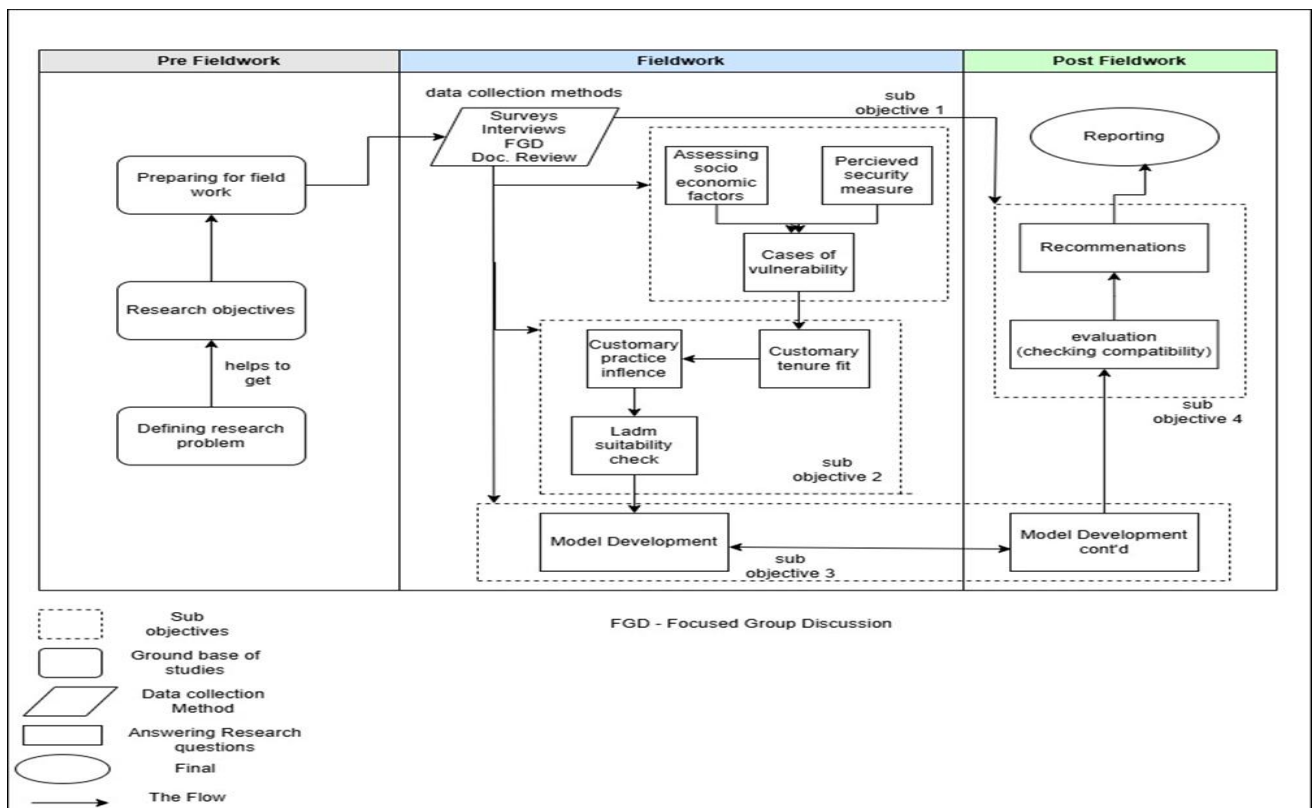


Figure 3 The methodological flowchart of the study

### 3.6. Ethical Considerations, Risks, and Contingencies

The study followed the university's Research Ethics Policy and secured approval from the Ethics Committee before data collection. Participants were informed about the study's aims and their rights, including the right to withdraw at any time. Informed consent was obtained, and participants were assured that the research was independent of local authorities and carried no legal implications.

Confidentiality and anonymity were strictly maintained. Personal data were anonymized and securely stored, and permissions were obtained for access to institutional records. A trained field assistant supported data collection in line with ethical standards.

Risks included the potential exposure of informal tenure arrangements and participant hesitancy due to fear or distrust. To mitigate this, the study emphasized anonymity, clarified its academic nature, and oversampled to ensure data adequacy. Findings were generalized to avoid identifying individuals or properties.

All data were securely stored and accessible only to authorized researchers, ensuring privacy and data protection. These measures ensured ethical compliance, safeguarded participants, and enabled the study to offer meaningful insights into tenure in Dome.

## 4. RESULTS

This result session introduces the findings on the field. This is from subsection 4.1 to 4.6, which gives the answers to the research questions under subobjectives 1 and 2, in that order from sub question 1 under subobjective 1, which is 4.1, in that order. For subobjective 3 and 4 with its sub questions, are answered in chapter 5.

### 4.1. Land Access and Use in Dome: Residential, Economic, and Social Dimensions

This section focuses on answering the sub research question 1 under sub objective one, revealing how land access gives what kind of use benefit? The below figure summarizes the coded responses for notable land use.

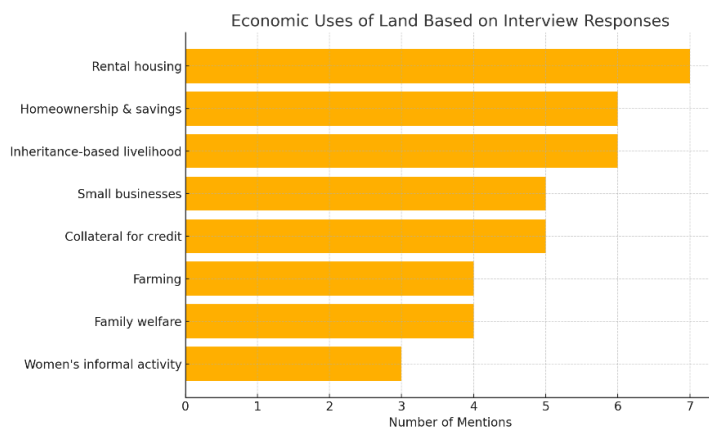


Figure 4 Frequency of Economic uses of land in Dome based on interview responses

In Dome, land is a highly valued economic resource, especially for individuals with access to land ownership. Across interviews, landlords and community members repeatedly emphasized that their livelihoods were tied to the ability to rent out land or property, often describing land as their “main source of income,” particularly in old age or during times of financial hardship.

*“Right now, I’m old, I don’t work anymore. I have tenants in four rooms, and that’s what I use to survive. It’s my retirement plan.” Resident 4 (Landlord)*

For women, the story was often similar, though access to land varied. In some households, land enabled small-scale commercial activity:

*“We built this container shop in front of the house. It’s mine, and I sell food every day. We couldn’t do this if the land wasn’t ours.” Resident 1 (Landlord)*

These examples demonstrate how land is not merely an asset to be owned but an active part of livelihood strategies. The importance of land in Dome’s socio-economic life aligns with broader research that shows land in peri-urban Ghana serves multiple informal economic functions, including housing, microbusinesses, and survival income

Additionally, rental income from land provides a financial buffer and a form of economic resilience, especially in a context where formal employment and social security systems are limited.

*“Everything comes from the tenants. If they don’t pay rent, we can’t even buy food.” Resident 8 (Landlord)*

Some participants emphasized that land in Dome is not only used for housing or rental income but also serves as a financial asset. Residents often use their land or building documents as collateral for loans, particularly for investing in small businesses, building construction, or covering family needs such as school fees or healthcare.

*“Yes, some people use their documents to take loans from banks or even susu collectors... Once the structure is built and they get some paper from Lands, they can get money on it.” Resident 7 (Landlord)*

*“Even if your land is not fully registered, as long as you have some kind of paper from the family or CLS, some financial people will still use it to give you money, especially those local savings groups.” Resident 4 (Landlord)*

*“I helped my sister get a loan because her land is registered. That made it easier for her to start her provisions shop.” Resident 3 (Landlord)*

This function demonstrates how land ownership, even informal, can act as economic capital in Dome. However, it also underscores tenure risk; when documentation is weak or disputed, residents risk losing access to credit or facing challenges repaying loans secured by disputed land.

From the focus group discussions with tenants, however, a different dimension of the land economy emerged: rising rental costs, insecure tenancy, and limited negotiating power. Some tenants reported that their rent was increased yearly without justification, while others lamented the lack of documentation.

*“We just agree verbally. There’s no paper. So, when the landlord says ‘leave,’ we have to leave.” FGD 1 (Tenant)*

*“The rent is going up every year, but we don’t know our rights. We don’t even know who owns the house sometimes.” FGD 2 (Tenant)*

This finding reinforces the precarity of land access for non-owners. Without regulation or formal contracts, tenants are excluded from land governance and are vulnerable to arbitrary eviction. As LSE Blogs (2024) reports in their study of informal settlements in Accra, the threat of displacement due to land value escalation is a defining feature of housing insecurity in peri-urban Ghana.

Another critical insight came from institutional participants, who acknowledged that the land market in Dome has been increasingly commodified over the past two decades. Land is no longer distributed based on social or communal principles but is now treated as a private economic asset:

*“It used to be family land and shared by the elders. Now, people just sell it like a business. They don’t even consult the whole family anymore.” – Family Head*

*“The whole place is like a land market now. If you don’t have money, you can’t get anything here.” Customary Land Secretariat Officer*

This shift from customary sharing to market-based selling has not only altered land use patterns but also created social tensions between landowners and the wider community, particularly among tenants and migrants who lack land inheritance rights. These findings reinforce the view that land in Dome is not merely a static asset but a dynamic economic engine, one that underpins livelihoods, supports multi-generational welfare, and provides informal financial stability in the absence of formal safety nets.

## **4.2. Common Land Disputes in Dome and Their Underlying Causes**

This section focuses on answering the subobjective one research question 2, which seeks to find the common land disputes in Dome, and their possible causes.

### **4.2.1. Inheritance and Family Conflicts: Power Struggles Within the Home**

In the Dome, land is often held and transferred through families under customary law. However, in the absence of clear documentation or transparent inheritance procedures, many of these transactions result in disputes among heirs and extended family members. These disputes frequently lead to overlapping sales and bitter legal confrontations.

From the interview with a landlord:

*“When my father died, he told us that the house and land would be shared between me and my two brothers. But my uncle, who was not even close to us, came from the village and claimed he was the one in charge of the land. Without telling us, he went ahead and sold a portion to someone else. We only found out when the new person came with papers and police to take possession. Since then, we’ve been fighting the case in court.” Resident 5 (Landlord)*

This kind of unauthorized land sale by extended family members is not unusual in Dome. The Customary Land Secretariat (CLS) confirmed that such cases are common:

*“One of the biggest issues we face is with internal family disputes. A family member might sell a plot without informing others, and because many of these sales are oral or witnessed informally, it’s difficult to challenge. Sometimes we only get involved after two people have already bought the same land.” CLS Officer*

These cases underscore how the lack of formal, enforceable documentation within customary landholding structures leads to fragile tenure security, even among generational landholders.

#### 4.2.2. Boundary Disputes and Encroachment:

Another major type of dispute identified in Dome is boundary conflicts, often resulting from imprecise measurements, lack of official surveying, and natural markers that are vulnerable to being moved or disputed.

*“We used to say the land starts from the neem tree and goes to the old well. That’s how our grandfather marked it. But now, the tree is gone, and the well is covered, and our neighbour is saying the line was never there. He has built part of his fence on our side, and now we are fighting.” Resident 6 (Landlord)*

These kinds of informal boundary agreements, often undocumented and based on verbal arrangements or natural landmarks, are difficult to prove or defend in court. The LIS Specialist confirmed this:

*“Many of the boundaries in Dome are informal. People use trees, stones, or even paths as markers. When those disappear, disputes begin. And because most people haven’t registered their land or done professional surveys, there’s no reliable way to prove anything.”*

Boundary conflicts affect not just neighbours but the ability of residents to confidently invest in their land, often resulting in hesitancy to build permanent structures or register the land formally.

#### 4.2.3. Customary vs Statutory Conflict: The Ghana Atomic Energy Case

Perhaps the most high-profile land dispute in Dome is the conflict surrounding the Ghana Atomic Energy Commission’s land acquisition. Originally acquired by the government in 1973 through Executive Instrument 3, this land was intended for public use. However, much of it remains underdeveloped, and portions have been resold to private individuals and firms without reverting the unused land to the original custodians, the Nii Sempe family.

*“That land was taken from us by the government in the 70s. They said it was for national science work — Atomic Energy. But till today, not all the land has been used. Instead of returning it to our family, they have leased it or sold parts of it to developers. That’s not just wrong, it’s illegal.” Family Head*

The Senior Lawyer said this,

*“There is a principle in land acquisition law that when land is taken by the state for public use and is later not used, it must revert to the original owners. Instead, government officials are reallocating or selling that land without proper consultation with the traditional families. This has led to many court battles and distrust in the state.”*

This case reflects how tensions between customary owners and state institutions continue to cause serious insecurity, particularly when state authority is seen as violating the customary social contract

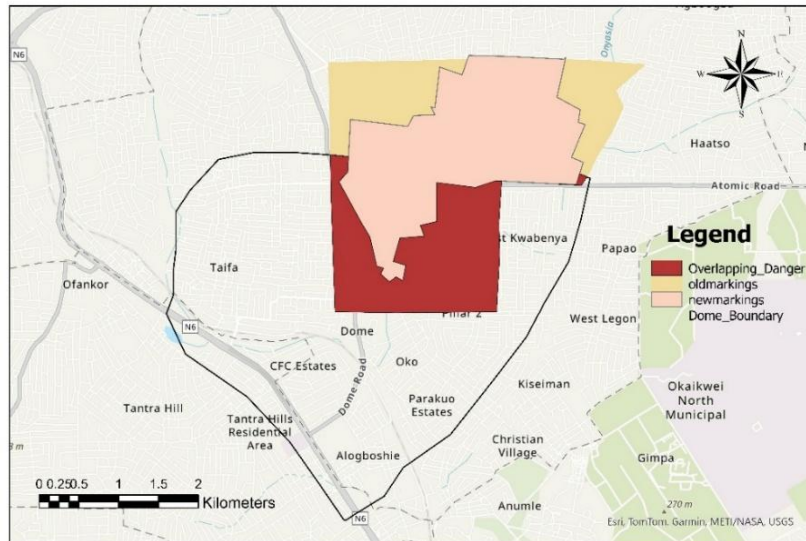
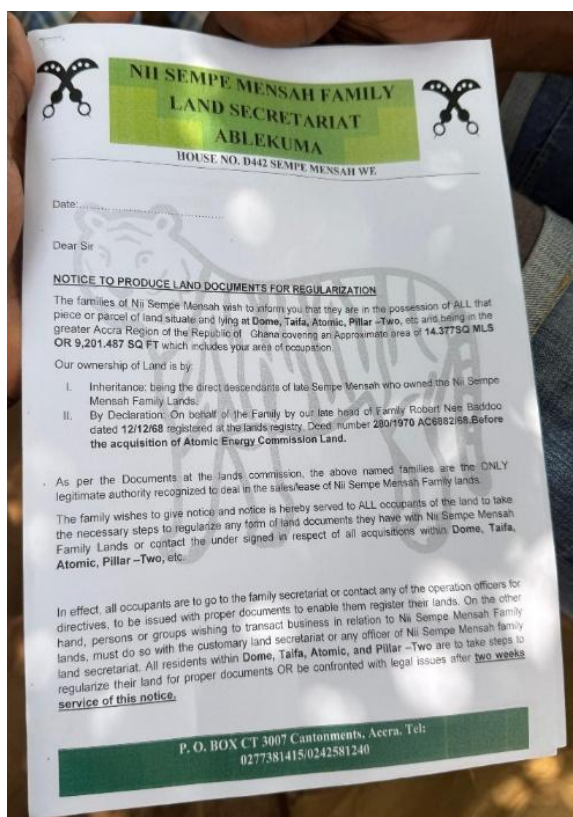


Figure 5 A Map Showing a disputed area between a state acquired land and the Nii Sempe Family of Dome

#### 4.2.4. Informal Sales and Lack of Documentation: A System Built on Trust, Not Paper

Many land transactions in Dome still occur without formal documentation, relying on community trust, verbal agreements, or minor receipts. These informal arrangements often fall apart when challenged, especially during land resale, inheritance disputes, or boundary disagreements.



*"I bought my land from a family member who everyone knew was in charge. I gave the money in front of two witnesses, and they signed a paper for me. But years later, another branch of the family said the sale wasn't valid because the land was not his alone to sell. Now I am in court, and my house is unfinished."* Resident 9 (Landlord)

The CLS Officer acknowledged the limitations of informal documentation:

*"Some of our records are just handwritten. They are not legally binding. That's why many buyers go straight to the Lands Commission or court when there's a problem. But by that time, the land is already being developed."*

This disconnect between customary informal practices and formal recognition fuels disputes and contributes to tenure insecurity.

Figure 6 A picture taken on field, which is a letter notice to the public, calling for calling for customary recognition

#### 4.2.5. Tenants at Risk: Eviction Without Recourse

Tenants, especially those renting from landlords with informal claims themselves, are particularly vulnerable to arbitrary evictions and exploitation. Many tenants in Dome lack rental contracts, and even long-term occupancy offers no protection.

*“We’ve lived in this house for 12 years. Then one day, the landlord said he was selling it, and we must move out in two weeks. No notice, no help, nothing. He just wants to develop the place now.” FGD 2 (Tenant)*

Another tenant added:

*“We are afraid to complain because the landlord can ask us to leave. Some women here have nowhere to go, but they don’t have any papers or proof to show they live here.” FGD 1 (Tenant)*

Tenure insecurity for tenants is not only a legal issue but also a social and economic vulnerability, particularly for women, youth, and migrants.

#### 4.2.6. Legal Confusion and Institutional Fragmentation

Participants often described the justice system as slow, difficult to navigate, or tilted in favor of those with resources.

*“Even when you take it to court, it takes years. If you don’t have money, you’ll lose. The other person may bribe or delay everything until you give up.” Resident 7 (Landlord)*

*“I went to the palace, and they ruled that the land was mine. But later, the other party went to court and got a different ruling. Now I’m stuck.” Resident 6 (Landlord)*

The existence of parallel dispute resolution mechanisms, customary versus statutory, has created conflicting outcomes and more confusion. This leads residents to rely on speed-building, connections, and informal means of claiming land.

The findings make it clear that land disputes in Dome are not isolated or occasional events. They are symptoms of deeper institutional and socio-cultural contradictions. Whether through family inheritance conflicts, boundary encroachments, unregulated evictions, or overlapping authority between chiefs and state agencies, residents live with a fragile sense of ownership, constantly worried about being displaced or challenged.

### 4.3. Perceptions of Land Tenure Security in Dome: Influencing Factors and Conditions

This section answers the sub research question 3 under sub objective 1, exploring the local perceptions of the Dome people when it comes to tenure security

#### 4.3.1. Fragmented Governance and Dual Land Systems

One of the most prominent governance issues in Dome is the fragmentation between customary and statutory land institutions. While residents often depend on chiefs and family heads to allocate land based on oral agreements and communal knowledge, these transactions are not recognized by the formal legal system unless formally registered through the Lands Commission.

*“Land allocation was traditionally based on family inheritance, oral agreements, and community recognition. Chiefs and elders played a significant role in ensuring fairness. But now, some power has shifted to government institutions. The customary secretariat tries to ensure proper documentation, but not everyone complies” Family Head Interview*

This fragmentation contributes to overlapping claims, duplications of land sales, and confusion over who has the legitimate authority to allocate or transfer land. According to the CLS:

*“We document transactions manually in books and verify ownership with elders. But our records aren’t digital, and the Lands Commission doesn’t recognize them unless the buyer goes through the formal process. People still trust our methods, but when things go to court, we get problems.” CLS Officer*

Thus, parallel land records are maintained one at the CLS and another by the Lands Commission with no real-time integration or collaboration, creating an administrative vacuum.

#### 4.3.2. Weak Institutional Capacity and Documentation Gaps

Another major governance gap is the weak capacity of customary institutions, especially when it comes to documentation, digital systems, and legal enforcement. The CLS lacks trained personnel, digital infrastructure, and legal authority to enforce land records:

*“Everything is on paper, and we do not have a system that allows us to share our records with the Lands Commission in real time. Most of us are not trained in GIS or database management, and that’s a problem if LADM is going to require digital systems.” CLS Officer*

These capacity issues contribute to delays, inconsistencies, and a lack of transparency, especially in dispute resolution.

Additionally, many families avoid registration due to high costs, as noted by the CLS:

*“The process is expensive, and many landowners cannot afford the survey fees and administrative charges. People think registering means losing control. There’s fear and mistrust.” CLS Officer*

This hesitation is also linked to a lack of awareness:

*“They don’t understand the benefits of formal registration. If the government can prove that registered land gets higher value, better access to credit, and legal protection, maybe more people would do it.” CLS Officer*

#### 4.3.3. Erosion of Customary Authority and Role Conflicts

While traditional leaders still play a central role in land governance, their authority is increasingly undermined by state institutions. The move toward formal registration has limited the influence of chiefs, creating tensions between customary leaders and statutory authorities.

*“Now that customary land has received title ownership, our role has changed. We still allocate land, but now the transactions must go through official channels. It’s not as simple as before.” Customary Authority Interview*

This power shift has led to confusion in communities about who has the final say in land matters. In some cases, chiefs’ decisions are later overruled by courts, especially in disputes involving government-acquired land or large real estate developers.

*“We settle land issues in the community, but people no longer listen to our rulings. Some take the matter to court, and then everything changes. It makes us look weak.” Family Head*

#### 4.3.4. State Intervention and Lack of Accountability

Customary leaders and residents alike voiced frustration over how government acquisitions are handled, particularly when unused state lands are not returned to their original owners or are reallocated for private use without transparency.

*“Government agencies sometimes allocate land for private development instead of giving unused land back to families. This has caused serious conflicts.” Family Head.*

The Atomic Energy case, cited by multiple stakeholders, is a clear example. The family claims the land was taken for public use but later resold to private interests, worsening trust between locals and the state.

#### 4.3.5. Socioeconomic Inequities in Access to Land

Finally, tenure insecurity is shaped by economic status and social position. Those with higher income or better connections are more likely to register land or defend it legally. Meanwhile, low-income residents, women, and tenants struggle to go through the process of land registration.



*“Land registration is not for the poor. If you don’t have money or connections, you’re on your own. That’s why many just build and hope for the best.” Resident 4 (Landlord)*

*“Even when we help them register, some families don’t have the documents required. They might have inherited the land orally or through an uncle. That’s hard to prove.” CLS Officer*

These inequities reinforce informal arrangements, leaving many without legal protection or recourse during disputes or evictions.

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#### 4.4. Barriers to LADM Applicability: Overlapping Claims, Informality, and Documentation Gaps in Dome

Now this section starts to answer the questions under the sub objective 2. This is to answer the research question 1 under sub objective 2, that seeks to find the barriers of an intended LADM applicability in such a social context.

##### 4.4.1. Prevalence of Oral Agreements and Manual Record-Keeping

Across interviews with both traditional leaders and officials at the Customary Land Secretariat (CLS), it was consistently emphasized that oral agreements remain the primary means of land allocation, especially for family and communal lands. These agreements are often witnessed by family heads or elders but are rarely accompanied by formally registered documents.

*“Land allocation was traditionally based on family inheritance, oral agreements, and community recognition. Chiefs and elders played a significant role in ensuring fairness. But the lack of formal documentation created disputes, so formalization is necessary to enhance tenure security.”* Family Head Interview

The CLS itself maintains manual ledgers and handwritten documents, which are prone to damage, loss, or manipulation:

*“We document land transactions manually in record books at the Secretariat... In some cases, we issue a customary allocation paper, but it is not recognized by the Lands Commission unless the buyer follows the formal registration process.”* CLS Interview

Such systems present data integrity challenges for digital integration, which LADM requires. In its current form, LADM relies on clearly defined parties (people or groups), spatial units (land parcels), and rights (ownership, lease, etc.), none of which can be reliably extracted from verbal transactions and informal paper records.

##### 4.4.2. Multiple Sales and Overlapping Claims: A Crisis of Trust and Data

The documents reveal widespread cases of double sales, inheritance overlaps, and boundary disputes, outcomes of both informal land deals and inadequate land record systems.

*“Yes, sometimes, chiefs sell land to multiple buyers, and the rightful owner comes to claim it.”* FGD 1 (Tenants)

*“Disputes persist due to overlapping claims and historical informal sales. Many still lack awareness of the importance of proper registration.”* Customary Authority Interview

Even when documents like site plans or indentures are provided, they are often not backed by legally recognized registration, making verification difficult and resulting in parallel claims to the same parcel.

*“Yes, in cases of missing documentation, individuals often must repurchase the land or face legal action.”* Family Head Interview

For a spatially enabled model like LADM, which depends on definable spatial units and unambiguous rights-holders, this kind of redundancy and conflict prevents clean data modelling and weakens the confidence in any single authoritative source

##### 4.4.3. Lack of Interoperability Between Customary and Statutory Land Databases

The CLS highlighted that its records are not integrated with the government’s formal land database at the Lands Commission, creating two parallel systems with no synchronization or shared verification processes.

*“CLS records are not digital... This creates two separate databases, one controlled by CLS and another by the government.” CLS Interview*

This absence of integration means that even when land is documented locally, the state system treats it as undocumented, leading to overwriting of customary claims and further disputes.

Participants from the CLS suggested that the LADM, if adapted, should include a customary verification step before formal registration:

*“There should be a Customary Verification Step in LADM, where before the land is formally registered by the Lands Commission, CLS officers verify that the land belongs to the seller and that all family members agree to the transaction.” CLS Officer*

#### 4.4.4. Cultural Perceptions and Resistance to Formalization

Several interviewees, including customary leaders, emphasized that some families are reluctant to formalize land claims because of distrust in the state and fear of losing land to government expropriation, especially in areas like Dome where the Atomic Energy acquisition case remains a sore point.

*“Some families also fear government interference in their land matters, which limits their willingness to engage in formal registration” CLS Officer*

Others perceive formal registration as expensive or bureaucratic:

*“They think registering means losing control. There's fear and mistrust.” CLS Officer*

These attitudes contribute to under-documentation, even among families who have owned land for generations, reinforcing the very conditions that LADM aims to resolve.

#### 4.4.5. Mismatch Between LADM Requirements and Dome's Tenure Realities

The CLS and family heads noted that many lands in Dome are family-owned or jointly held, yet current formal systems, and even LADM in its standard form, assume single-party ownership.

*“Land is often registered in a single name, which does not reflect the reality of family land ownership in Dome. We suggest that the system include a ‘Protected Family Land’ category.” CLS Officer*

Such a category would allow LADM to represent **shared family rights**, multiple claims, and customary landholding structures more faithfully. Without such adaptation, stakeholders warned that the model would fail to capture the nuances of Dome's land dynamics.

### 4.5. Modifying LADM to Reflect Local Tenure Practices in Dome

This section answers research question 2 under sub objective 2.

#### 4.5.1. Customary and Family-Based Tenure Requires Structural Adaptations in LADM

One of the most recurring insights across interviews with the Customary Land Secretariat (CLS), family heads, and landowners in Dome was that the dominant form of land tenure is family-based and communal, with ownership passed through inheritance or clan-based allocation systems. These arrangements often do not conform to singular ownership models as currently represented in the default Land Administration Domain Model (LADM).

*“Land in Dome is typically not owned by one person... It's owned by the family. Even if it's one person's name on paper, the decisions about land use are made by the family head or elders.” CLS Officer*

This implies that LADM's 'Party' class (representing individuals or organizations who hold land rights) must be adjusted to allow for multi-party and family group ownership structures. A suggested solution from multiple stakeholders was the creation of a 'Family/Clan Entity' subclass under 'Party' to accommodate collective tenure rights, responsibilities, and inheritance practices.

*“Our land is in the name of the family. If we must use any system, it should allow us to document multiple parties, not just one owner.”*

Resident 3

#### 4.5.2. Need to Include Oral Agreements and Customary Records in the LADM Structure

Several respondents, including traditional leaders and tenants, highlighted the pervasive use of oral agreements to transfer or allocate land. These agreements, while culturally legitimate, are not formally documented and, therefore, excluded from, standard land information systems such as GELIS, that rely on written records.

*“Most people just get a piece of land from their uncle or the chief. No papers. Just verbal agreement and witnesses.” Resident 6 (Landlord)*

The current LADM does not accommodate undocumented or oral land rights, yet these form the basis of thousands of land transactions in peri-urban Ghana. Respondents proposed that LADM be extended to include an attribute for "Evidence Type", where oral traditions, customary endorsements, or local witness validation could be recorded even if not legally binding.

*“We have our records in the family book or some chief’s endorsement. If LADM only accepts official government documents, most people will be excluded.” Family Head*

This calls for a customized classification of land rights that acknowledge informal and semi-formal forms of evidence.

#### 4.5.3. Inclusion of Dispute Resolution Mechanisms in Tenure Modelling

Another vital insight came from both the legal expert and CLS participants who emphasized that dispute resolution processes, particularly customary arbitration and family-level conflict resolution, are essential components of how land governance operates in Dome.

*“We don’t go to court first. If there’s a dispute, the elders try to resolve it. Then the family head. Only when it fails, people go to court.” Family Head Interview*

*“There’s no place in the model to include this process. But it’s a big part of our land system the model must capture it.” CLS Officer*

Currently, LADM does not explicitly include dispute resolution processes or local arbitration records. Several interviewees suggested that the model incorporate a “DisputeRecord” or “ConflictResolution” class or attribute to document cases, outcomes, and traditional methods used in resolving land conflicts.

This would increase trust in the system and ensure that LADM reflects the real-world pathway that land users take when their rights are contested.

#### 4.5.4. Flexibility for Representing Temporality and Evolving Rights

Interviewees also noted that land use and ownership arrangements in Dome are often temporary, evolving, and conditional. Rights can change due to migration, marriage, death, or family disputes.

*“Sometimes someone is managing land on behalf of others, or their right depends on whether they live there or not.” Resident 5(Landlord)*

*“Land status can change when the family head dies. Or if a tenant wants to buy it permanently. These transitions are important.” CLS Interview*

To handle these dynamics, the proposed model leverages the existing temporal structure of LADM, particularly the VersionedObject superclass from which most classes inherit. This allows the inclusion of start and end dates, as well as versioning of rights and relationships over time. By utilizing these built-in temporal attributes, the model can reflect the fluid nature of tenure in Dome, capturing transitions such as inheritance, changing household arrangements, or temporary caretaking. Emphasizing this capability is critical for accurately modelling tenure systems where land rights are rarely static or permanently fixed.

#### 4.5.5. Community-Driven Data Input and Local Verification in the Model

There was a strong call across interviews for the LADM to incorporate community validation mechanisms, especially before any land registration is finalized.

*“Sometimes a person will come to register land, but the family hasn’t agreed. That creates tension. If you want to build trust, you must let the family and community verify before registration.” Resident 8 (Landlord)*

A proposed adjustment was to include a “Verification Phase” in the workflow of LADM implementation, where customary authorities or community assemblies verify claims before they are validated by statutory bodies like the Lands Commission.

This would bridge the trust gap and create a hybrid workflow where both systems are respected and involved.

### 4.6. Socio-Cultural Norms Shaping Land Access and Their Implications for Formal Land Data Models

This section answers the sub research question 3 under subobjective 2

#### 4.6.1. Inheritance and Family Control over Land Allocation

In Dome, inheritance remains the dominant method of land transfer, with family heads and elders overseeing how land is redistributed. These decisions are often not documented and are influenced by clan hierarchies, generational positions, and family negotiations, all of which are difficult to capture in formal land administration frameworks.

*“In our family, we share land based on the line of birth. The elders decide who gets what. There’s no paper, but everyone knows the boundaries.” Family Head Interview*

This customary inheritance practice challenges LADM’s party and right classes, which assume clear, individually registered interests in land. Without provisions for capturing family-based or generational rights, LADM risks excluding the most common form of tenure in Dome.

#### 4.6.2. Oral Transactions and Lack of Formality

Many land dealings in Dome are sealed by oral promises, witness statements, and customary tokens (e.g., drinks or cash), not legal contracts.

*“My land was given by my uncle. We called elders to witness, and I gave gin. That was the transaction.” Resident 2 (Landlord)*

Such transactions, though legitimate by local standards, are hard to validate in a formal system like LADM that relies on documented proof. There is a cultural belief that “what the elders say is law”, which LADM needs to accommodate through metadata tags, trust-based registries, or customary verification workflows.

#### 4.6.3. Communal and Multi-Party Ownership Norms

Land in Dome is often viewed as a communal resource, especially among extended families. It’s common for multiple people to claim authority over one parcel; one person may hold user rights, another allocative power, and a third inheritance stake.

*“Even if the land is in one person’s name, we all have a say. You can’t sell it without calling the rest of the family.” Resident 8 (Landlord)*

This shared tenure makes it difficult for LADM to assign clean-cut rights to individuals. The model needs to be adjusted to allow for bundled or layered rights, representing the social hierarchy of decision-making and control.

#### 4.6.4. Patriarchal Decision-Making and Gender Exclusion

Women in Dome often lack formal say in land decisions, even when they contribute to land development or maintenance. Most decisions are made by male elders or family heads, leading to gender-based exclusion in documentation and inheritance.

*“It’s the men who go and talk to the chief or sell the land. Even if the land was given to the woman, it’s the brother who keeps the paper.” FGD 1 (Tenants)*

Without adapting LADM to recognize secondary rights or marital claims, especially where documentation is male-dominated, women may be left unrepresented in land records. This highlights a need for gender-sensitive attributes in the LADM schema.

#### 4.6.5. Community-Based Dispute Resolution and Social Legitimacy

Most land conflicts in Dome are first resolved at the family or chief level, not in the courts. These resolutions are not officially documented, but they carry binding social legitimacy.

*“We don’t go to court. The chief settles it. Once he speaks, that’s final. No lawyer needed.” Resident 9 (Landlord)*

LADM implementation must consider these customary dispute mechanisms as part of the tenure documentation process. A “dispute history” attribute or optional customary ruling annotation could enhance the model’s acceptability and relevance.

## 5. MODEL DEVELOPMENT AND VALIDATION

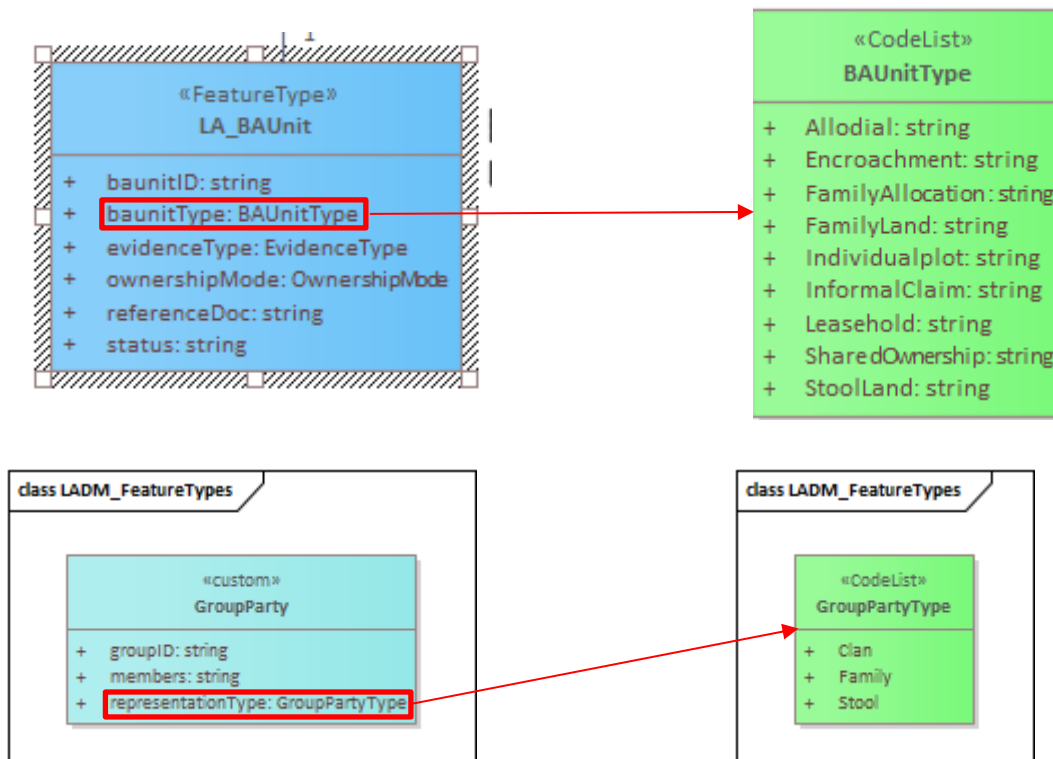
This chapter addresses research objectives 3 and 4, stated earlier. These two objectives cover findings on the model development and the validation. To maintain brevity, the results below provide a concise summary of key model elements and relevant validation results. Full field quotes, detailed examples, and supporting analysis can be found in **Appendix L**.

### 5.1. The Proposed Model.

This section details the essential tenure relationships in Dome ranging from consent-based family ownership to contested formal titles and illustrates each with evidence from the field. These findings show how various actors (family members, women, tenants, chiefs, title holders, leaseholders) interact within the same spatial unit or overlapping tenure, underscoring the need to document these relationships holistically

#### 5.1.1. Family Land and Consent-Based Decision-Making in Sales

Family land tenure in Dome operates under a collective decision-making, where any sale or transfer must be approved by the extended family through customary processes. This proposal extension, to be enforced by family elders and the Customary Land Secretariat (CLS), can ensure that no individual can unilaterally dispose of communal land. It serves both as a cultural norm and a safeguard against unauthorized transactions and multiple sales. Recognizing family co-ownership and consent requirements is crucial for any land tenure model seeking to reflect local realities. Further interview insights and examples supporting this finding are presented in Appendix L.



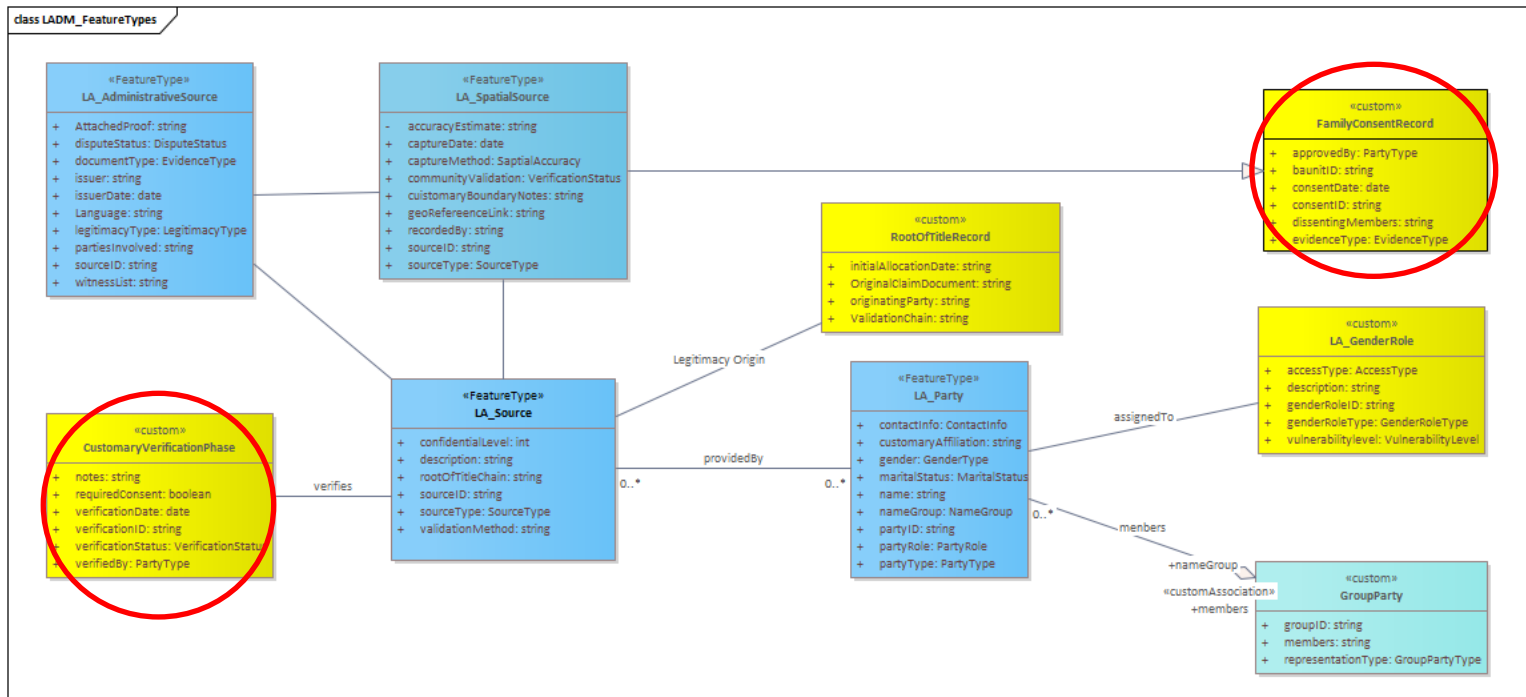


Figure 7 Extending the core LADM classes to capture the group party and the verification form the group party

### 5.1.2. Informal Landholders Lacking Formal or Customary Recognition

A significant portion of Dome's residents occupy land without formal title or customary endorsement. These informal landholders, often relying on undocumented allocations or verbal agreements, exist in a legal grey area with limited tenure security. Their claims are not recognized by the state and are often unverified by customary authorities, making them highly vulnerable to eviction, conflict, or dispossession. This group represents a critical gap between lived land realities and official records, underscoring the need for inclusive tenure documentation mechanisms. *Supporting testimonies, focus group examples, and official remarks are detailed in Appendix L.*



Figure 8 Extending codelist, and the Core LADM to capture Informal Rights

### 5.1.3. Gender Dynamics: Women's Exclusion from Land Decision-Making

In Dome, land-related decisions are predominantly made by men, often sidelining women's voices in inheritance, sales, and registration processes. Despite their involvement in family landholding, women's rights are typically mediated through male relatives and are rarely documented or formally recognized. This exclusion presents a critical tenure vulnerability, as women's land use is often insecure and subject to reversal. Documenting gender-based tenure dynamics is therefore essential to ensure more inclusive and equitable land administration systems. *Relevant field cases, testimonies, and supporting examples are provided in Appendix L*

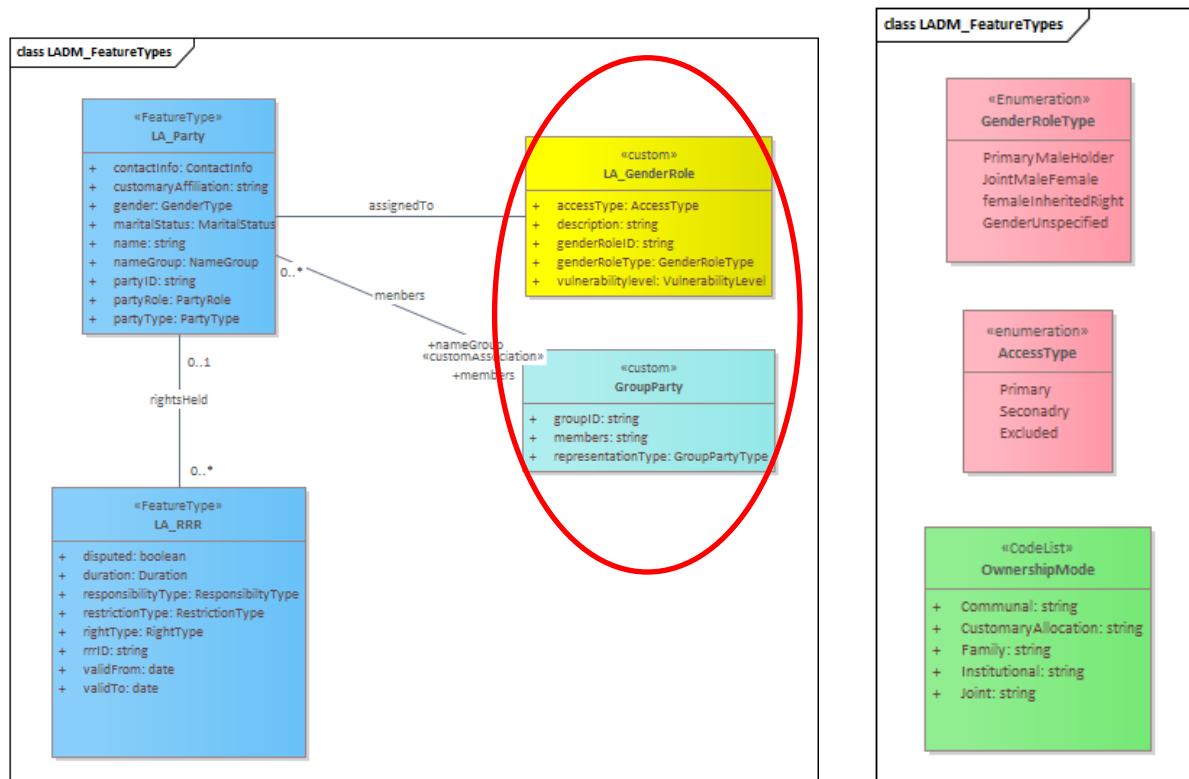


Figure 9 Extending Core LADM to heighten the recognition of a more balanced gender representation.

### 5.1.4. Tenants with Insecure Rental Rights

Tenants in Dome occupy a precarious position in the land tenure landscape. Most rental agreements are informal or verbal, leaving tenants with limited protection against sudden eviction or shifting landlord terms. Their rights are typically undocumented and entirely dependent on the landlord's authority, who may be a private owner, family representative, or caretaker. As a growing group in this peri-urban area, tenants represent a critical tenure category that is often overlooked in land records, yet their presence and vulnerabilities must be acknowledged in any inclusive tenure model. Detailed focus group testimonies and examples of tenant experiences are included in Appendix L.





### 5.1.6. Formal Title Holders and Contested Rights

The expansion of Ghana's formal land title system into Dome has introduced overlapping tenure claims, particularly between registered title holders and customary landowners. These contested rights often arise when formal documentation is issued without proper consultation of customary authorities, leading to prolonged disputes and legal uncertainty. Such cases highlight the tension between statutory and customary systems, where both parties claim legitimate rights to the same parcel. Acknowledging and documenting these conflicts is critical, as they reveal the layered and sometimes adversarial nature of land tenure in peri-urban contexts. *Illustrative cases and interview narratives are presented in Appendix L.*

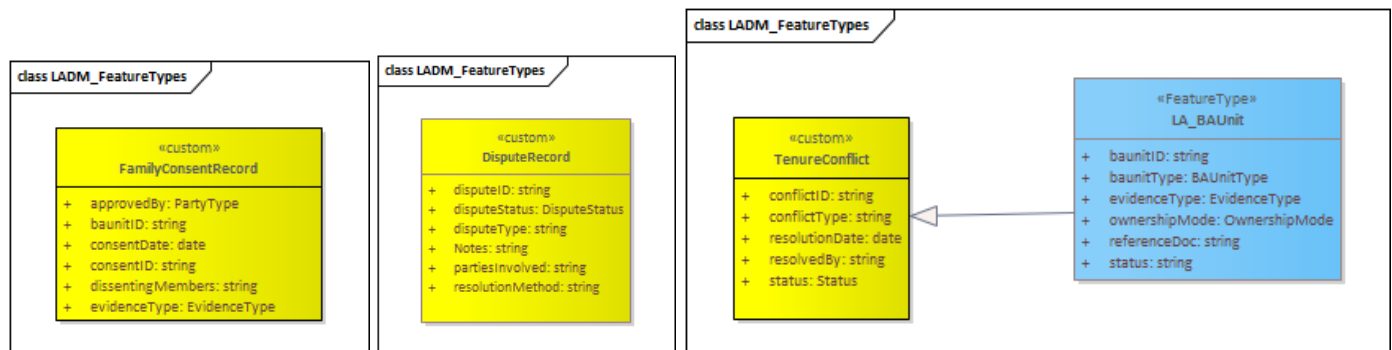


Figure 12 Proposed extensions, of the core LADM, to flag awareness conditions of parcel(s) available for sales

### 5.1.7. Leaseholders and Derived Secondary Rights

Leasehold arrangements are a key component of Dome's layered tenure structure. These legally defined, time-bound rights link customary owners, intermediate leaseholders, and end-users through a chain of derived interests. Leaseholders often occupy a middle ground between landowners and tenants, holding exclusive rights for a fixed duration while remaining subject to superior claims. Recognizing and documenting leaseholds is critical, as they represent transitional rights that influence land use, investment decisions, and long-term tenure security. *Detailed examples and supporting field insights are presented in Appendix L.*

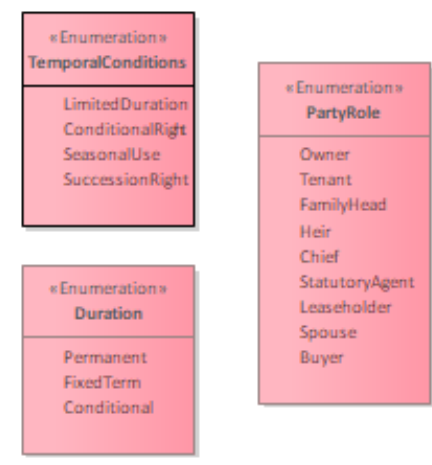


Figure 13 Recognizing the Rights of The Non-Primary Land Users

### 5.1.8. Interdependencies:

The above relationships do not exist in isolation; they often intersect on the same land parcel. For example, a given plot in Dome could simultaneously involve a stool chief's allodial title, a family's customary claim, an individual occupant with a sale agreement (awaiting family consent), a tenant renting a house, and perhaps a history of dispute between the family and that individual. These layers influence one another: a chief's endorsement might be needed for the family to recognize the sale; the tenant's fate depends on whether the individual's claim is upheld; a woman in the family might contest the sale if her consent was bypassed; and if a formal title is sought, all these existing interests ideally should be reconciled. The figure

14 shows the propose conceptual model to achieve this, using the Land Administration Domain Model (LADM) as a basis and extending it to accommodate Dome's intricate tenure arrangements.

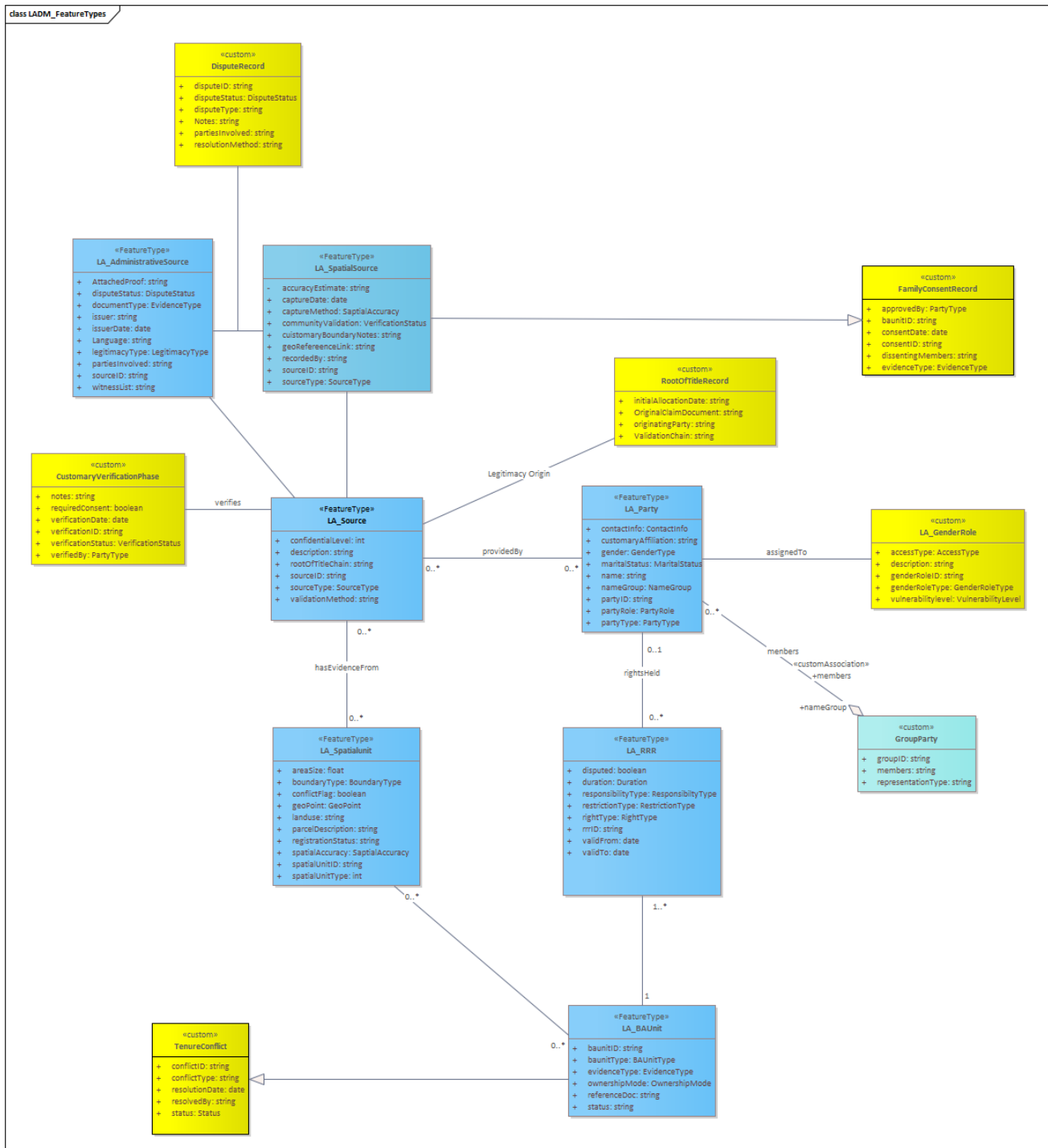


Figure 14 A full capture of the proposed and extended core LADM aligned to the DOME social tenure arrangement context

The model's handling of temporal changes in rights, such as transitions due to inheritance, caretakership, or sale, builds upon the existing functionality provided by LADM's VersionedObject class. Since most LADM classes inherit from this superclass, the model can systematically record start and end dates of tenure relationships, enabling versioning of rights over time and accurately reflecting Dome's dynamic tenure context.

## 5.2. Validation of the Proposed Model.

This section presents the results of Objective 4: validating parts (custom extensions) of proposed LADM-based conceptual model through scenario testing used by Enemark, Williamson, and Wallace (2005), using real-case scenarios to test the functionality of proposed cadastral systems in land administration reform. A total of seven real-life-inspired land scenarios drawn from Dome were presented to land administration experts, legal practitioners, community stakeholders, and land users through Google Forms. Respondents evaluated each scenario using a structured feedback form aligned with one or more of the six evaluation criteria: representational accuracy, terminological fit, completeness, practical feasibility, legal and institutional alignment, and scalability. Full details of each scenario and the form used, and responses given, are provided in Appendix K.

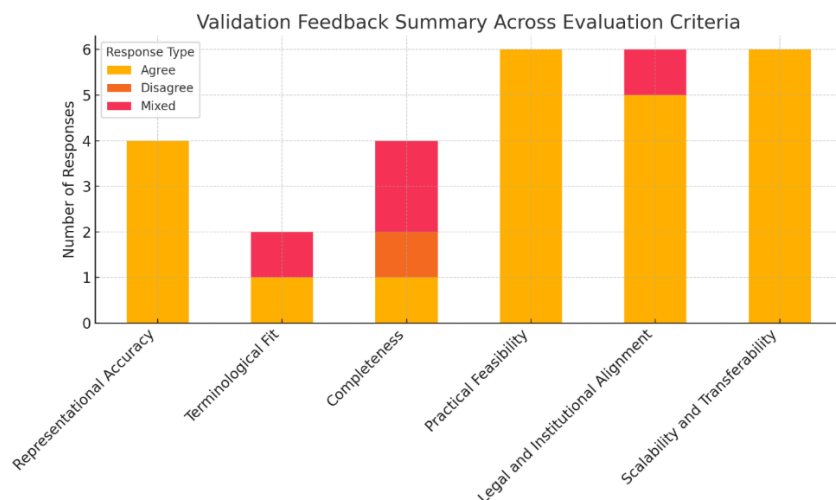


Figure 15 Validation feedback summary across all the evaluation criteria

### 5.2.1. Representational Accuracy

This criterion assessed whether some part of the proposed model adequately captured the types of tenure relationships and disputes typical of Dome's land environment.

#### 1. Unauthorized Sale by Single Family Member Scenario

A family member (Kwame) sells land without broader family consent, claiming he is the eldest male. All two respondents unanimously agreed this is a frequent occurrence in Dome. They emphasized that the model's requirement for multi-party family consent, including head of family and witnesses, accurately reflects the need for collective validation in such contexts. Respondents supported the inclusion of consent verification mechanisms and supported the proposed FamilyConsent attribute in the model.

#### 2. Oral Grants to Women Not Formally Recorded Scenario

The scenario involving Auntie Efua raised the question of whether the custom extensions, of the model accommodates undocumented but legitimate oral grants. The respondent (from the customary secretariat) stated this was realistic and emphasized the need to represent such cases through classes like RootOfTitleRecord and CustomaryEvidence. The model's flexibility to accept oral records, with community or elder verification, was seen as essential for fair representation of women's land claims.

The presented part of the model achieved a 100% agreement rating under the representational accuracy criterion. Respondents affirmed that the model closely mirrored common tenure scenarios in Dome, such as unauthorized family land sales and undocumented grants to women. They particularly valued the model's ability to capture these complex and informal realities through features like consent verification, CustomaryEvidence, and RootOfTitleRecord. This suggests strong alignment between the model's structure and the lived land dynamics in peri-urban Ghana.

### 5.2.2. Terminological Fit

This criterion examined whether the language used in the presented part of the model was clear, familiar, and aligned with local land management practices.

#### 1. Gender Bias in Inheritance Scenario

The case of daughters being excluded from inheritance was noted as a culturally accurate scenario. However, some respondents highlighted confusion over terms like “RRR (Rights, Restrictions, Responsibilities)” and “LA\_PartySubtype.” The participant suggested revising labels for usability among non-technical users. However, the core structure of recognizing multiple co-heirs was praised. The below Fig, 17 and 18, shows positive score gains.

### 5.2.3. Completeness

This criterion tested whether the presented part of the model extension, covered a full range of tenure arrangements, formal and informal.

#### 1. Verbal Lease Dispute after Landowner Death Scenario

There were 5 respondents, some agreed, and others did not agree that verbal leases, especially witnessed by neighbors needed to be recorded, or had to accept lease with local witness or was very useful. But they are all agreed the system being able to flag dispute was very okay. The model’s VerbalAgreement and WitnessStatement structures were viewed as essential to prevent eviction and land loss under such circumstances. The scenario confirmed that the model must account for informal but witnessed agreements, which are widespread.

2. Would you you accept such a lease arrangement if supported by local witnesses (e.g., neighbors, assemblyman)?  
5 responses

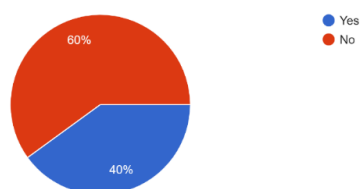


Figure 16 A validation response chart telling the incompleteness of the presented parts of the model due to a lot more no than yes

6. Should leaseholders be recorded as proposed by the system even if they are not the landowners?  
5 responses

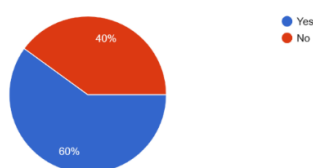


Figure 17 Another validation response chart telling the incompleteness of the presented parts of the model

#### 2. Boundary Disputes Based on Natural Landmarks Scenario

The two participants, who are family representatives, agreed that disputes about boundaries defined by trees or streams are common. While some questioned how the model would spatially handle uncertainty, they supported including DisputedBoundary and ApproximateSpatialUnit options.

### 5.2.4. Practical Feasibility

This criterion assessed whether stakeholders would use the presented part of the model and whether it supports everyday workflows.

#### 1. Conflicting Leases from Sub-Chief and Head Chief Scenario

The scenario involving overlapping leases was unanimously seen as representative of real conflicts in Dome. The six respondents supported model rules that require verifying authority hierarchy before accepting leases. The model's embedded roles and hierarchy validation mechanisms were found practical and necessary. Figures 18 and 19 below show some of the responses.

3. Should a proposed system like the above, record the source of authority (e.g., who granted the right and under what structure) for each lease?  
6 responses

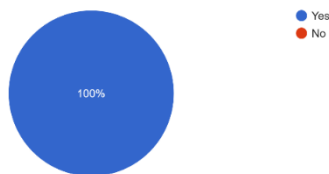


Figure 18 6 respondents on scenario case of practical visibility give a 100 percent score

6. Would you have accepted a lease issued by a sub-chief if it was registered and undisputed at the time of entry?  
6 responses

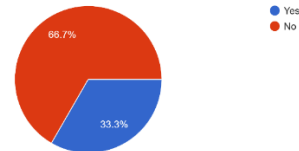


Figure 19 A considerable amount of no response to confirm the essence of rootOfTitleSearch

While other criteria showed varied opinions, Practical Feasibility received unanimous support, reflecting the model's clear alignment with stakeholder expectations and workflow realities, particularly in resolving common conflicts around traditional authority roles in lease agreements.”

### 5.2.5. Legal and Institutional Alignment

#### 1. Reversion Rights on Government-Acquired Land Scenario

This scenario tested whether the presented part of the model could handle complex historical claims and reversion clauses. Respondents (who is a family chief), affirmed that this happens in many government-acquired lands in Accra and applauded the proposal to add a RootOfTitleRecord or ReversionRight class. Respondents also noted the model aligns with provisions under Ghana's Land Act, 2020 regarding recognition of historical interests.

### 5.2.6. Scalability and Transferability

All respondents agreed that similar tenure issues exist across other peri-urban areas in Ghana. They stated the model, though developed for Dome, could be extended to places like Adenta, Madina, or Kasoa.

Under the criterion of scalability and transferability, all respondents agreed that the proposed model could be adapted and applied in other peri-urban settings across Ghana. The key reasons included the commonality of land tenure challenges (e.g., family sales, informal occupation, and layered claims) and the model's flexible design. Respondents emphasized that with sufficient awareness creation and institutional support, the model's consent-checking, dispute-handling, and documentation structures could benefit communities beyond Dome.

## 6. DISCUSSION

In this chapter, the empirical findings from Dome are critically discussed in relation to the study's four sub-objectives and the broader literature on land tenure and governance. The discussion interprets how Dome's local realities of land access, tenure security, and governance align with, or challenge established concepts such as tenure security, informal tenure arrangements, the Land Administration Domain Model (LADM), the continuum of land rights, legal pluralism, conflict resolution, and participatory governance. Each section below corresponds to a research sub-objective, integrating interview and focus group results with scholarly perspectives and theoretical frameworks. The narrative highlights the socio-political dynamics of customary land management in Dome, identifies gaps in statutory land governance, and considers implications for developing a localized LADM-based model that bridges formal and informal tenure practices.

### 6.1. Land Access, Use, and Tenure Security in Dome

The findings under Objective 1 reveal that land in Dome functions not only as a physical asset but as a cornerstone of socio-economic life. Its use spans economic survival, intergenerational wealth, and informal welfare practices dimensions that go far beyond what formal land administration frameworks typically record. This reinforces the importance of designing a land administration model that is sensitive to the lived realities of land use and rights.

#### 6.1.1. Patterns of Land Access and Use:

Findings reveal that land in Dome is accessed primarily through customary channels, notably family inheritance and informal purchases from customary owners, rather than through formal markets. Many long-term residents obtained land as a family asset passed down through generations, reflecting the enduring role of lineage in land. This is consistent with broader Ghanaian patterns, where 70–80% of land is held under customary tenure (Anyidoho et al., 2008) and transferred via unwritten traditions. As Dome has urbanized and land values have surged (Asafo, 2023), these customary practices have increasingly given way to commodification: land that was once communal or family-shared is now frequently treated as a market commodity to be sold to the highest bidder. A family elder noted that “people just sell it like a business. They don’t even consult the whole family anymore,” illustrating the shift from social tenure norms toward profit-driven transactions. This mirrors observations in peri-urban Ghana that rapid urban growth and rising land value are eroding traditional landholding norms and spurring market behaviour (Asafo, 2020; LSE, 2024). Indeed, as an officer of the Customary Land Secretariat (CLS) in Dome lamented, “The whole place is like a land market now. If you don’t have money, you can’t get anything here,” underscoring new socio-economic barriers to land access for the less wealthy. These changes resonate with the literature on land commodification, which warns that monetization of customary land can marginalize the poor and disrupt community cohesion (Ubink, 2007; Chimhowu, 2019). The findings also show that land in Dome is central to livelihoods: some residents use land for small businesses or agriculture, and a few respondents even reported using their land as informal collateral to access credit in community lending arrangements. Women engage in petty trading from home (e.g. operating kiosks on family land), reflecting how access to a plot can empower informal economic activity for households. However, women’s land access remains largely mediated by family relations rather than direct ownership, aligning with studies in Accra that highlight gender disparities in land tenure security (Teye & Owusu, 2015). Overall, Dome’s land access and use patterns exemplify a continuum of land rights: they range from long-standing informal rights (inherited family plots recognized by the community) to emerging individualized transactions, occupying various points between purely customary and formalized tenure (UN-Habitat, 2012).

#### 6.1.2. Tenure Security and Insecurity:

The largely informal tenure regime in Dome has profound implications for perceived tenure security. On one hand, customary tenure arrangements provide a degree of de facto security through social legitimacy, long-term residents often feel secure as long as their community recognizes their claims, even if they lack state-issued title (Okyere, 2021; Alhola & Gwaindepi, 2024). Our interviews confirm that many landholders trust the “word of the chief or family head” and local witnesses as sufficient proof of ownership under normal circumstances. This reflects what Alhola & Gwaindepi (2024) observed: even without formal title, people derive security from the social acceptance of their rights. However, the findings also underscore that such informal tenure security is fragile and easily disrupted. Numerous residents recounted experiences or fears of losing land due to undocumented deals and competing claims. For example, one family inherited a house

informally, only to find that an extended relative secretly sold part of the land to a third party who arrived with “papers and police” to enforce the sale. Without any formal record of the family’s prior right, their claim became difficult to defend, plunging them into a protracted legal battle. This case highlights how lack of formal documentation leaves even generational landholders vulnerable. It echoes Ubink’s (2007) findings in peri-urban Ghana that tenure security promised by customary arrangements can prove illusory when challenged by opportunistic actors, a caution that “tenure security” may be more wishful policy thinking than on-the-ground reality in such settings. Our data show that conditions which improve a resident’s sense of security include having some form of documentation (even if just an allocation paper or a sale receipt signed by witnesses) and clear acknowledgment of their land rights by both family and local authorities. Indeed, participants who had managed to register their land or secure a formal indenture reported greater peace of mind, corroborating studies that formal title can bolster perceived security (Alhola & Gwaindepi, 2024). Yet formal title is rare in Dome, fewer than 10% of parcels are registered in Ghana overall, and not a panacea: formalization alone cannot guarantee security when legal pluralism and weak enforcement persist (Alden Wily, 2022; Chimhowu, 2019). Even titled owners can face disputes if others question the legitimacy of the title or if the state’s own actions (such as expropriation) override it. The Ghana Atomic Energy Commission case in Dome illustrates this: the government acquired a large tract in the 1970s for public use, but decades later much of it was unused or diverted to private developments without returning land to the original customary owners. Customary families (the Nii Sempe) feel insecure and betrayed as their land remains in limbo, legally taken but not fully utilized for the intended purpose, and now allegedly misallocated. As a family head interviewee put it, “not just wrong, it’s illegal” that the unused land was not reverted. A legal expert confirmed that under Ghanaian law, state-acquired land should revert if not used for the public project, but this principle has been flouted, leading to court battles and deep mistrust in state institutions. This scenario demonstrates how statutory gaps and lack of accountability in public land management can severely undermine tenure security for communities. It also exemplifies the clash of legal orders, customary vs. statutory, a hallmark of legal pluralism (Salifu et al., 2019). In Dome, such cases feed a narrative that the formal system cannot be trusted to safeguard local land rights, reinforcing reluctance to engage with formal titling.

### 6.1.3. Common Land Disputes and Conflict Resolution:

The research identified several prevalent types of land disputes in Dome, each with distinct causes rooted in the interplay of informal and formal systems. Inheritance and family disputes are the most frequently mentioned: unclear succession processes lead to multiple heirs or relatives laying claim to the same plot. Absent written wills or titles, power struggles within families emerge, as seen in the case where an uncle unilaterally sold land promised to his nephews. Such internal conflicts often result in overlapping sales (the land is “sold” twice, first informally within the family and then to an outside buyer) and eventually litigation when the different claimants collide. The CLS Officer confirmed these scenarios are common, noting that because many sales are oral or only witnessed informally, it’s difficult to challenge a bad-faith sale until it’s too late, “sometimes we only get involved after two people have already bought the same land”. This aligns with reports of overlapping claims in Ghana’s peri-urban zones (Owusu Ansah, 2022; Okine, 2024), where undocumented transactions allow unscrupulous family members or chiefs to resell land to unsuspecting buyers. Another major category is boundary disputes and encroachment, which our findings traced to imprecise demarcations under customary practice. Traditionally, boundaries in Dome were marked by natural features (trees, streams) or vague descriptions rather than surveyed coordinates. One resident explained that their grandfather’s boundary was “from the neem tree to the old well”, but once the tree died and the well was covered, a neighbour encroached and claimed the previous boundary “was never there”. Lacking formal survey plans, such disputes devolve into word-against-word arguments. A land information specialist we interviewed observed that informal boundaries are pervasive in Dome and, when physical markers disappear, “there’s no reliable way to prove anything”. This not only pits neighbours against each other but also deters investment; people become hesitant to build permanent structures or register land when their parcel limits are uncertain. This finding reinforces the importance of spatial certainty for tenure security found in the literature: without clear parcel delineation, even well-intended owners can end up in conflict (Simbizi et al., 2014). A third notable dispute type in Dome involves customary vs. statutory claims, exemplified by the above-mentioned Atomic Energy land conflict. Here, state acquisition and customary ownership norms collide, leading to protracted disputes between families and government agencies. Such high-profile clashes highlight how legal pluralism without coordination breeds insecurity, customary owners feel dispossessed by opaque state actions, while the state’s authority is questioned by locals who see promises broken. These dynamics reflect patterns across Ghana: despite new laws like the 2020 Land Act intended to harmonize tenure, implementation lags and overlaps persist (Arhinful, 2021).

In coping with disputes, Dome residents largely favour informal and community-based resolution mechanisms as a first resort. Participants consistently reported that disputes are initially taken to family elders, clan heads, or the local chief for mediation. One family head explained, “We don’t go to court first. If there’s a dispute, the elders try to resolve it... Only when it fails, people go to court”. This is typical of Ghana’s dual land governance, where customary arbitration is accessible and culturally resonant, whereas courts are seen as a last resort due to cost and delay (Buehren et al., 2017; Okyere, 2021).



The chief's palace or family meeting often settles boundary disagreements or inheritance quarrels through negotiation, compensation, or reallocation. However, our findings also show the limits of informal dispute resolution in an urbanizing context. Many participants noted that if a dispute involves outsiders or large financial stakes, or if one party seeks an injunction or enforcement, eventually the state institutions become involved (police, courts, Lands Commission). At that point, any informal resolutions or evidence can be overridden by statutory legal criteria. Indeed, several interviewees expressed frustration that court rulings sometimes invalidate local agreements: "Some take the matter to court, and then everything changes. It makes us look weak," a family head said of instances where a chief's decision was later reversed by a court order. This reflects a power asymmetry in legal pluralism, customary forums handle most everyday cases, but the formal system has the final say and can upend earlier resolutions (Boone, 2019). In Dome, the outcome is a fragmented justice environment where neither, fully satisfies residents: customary authorities feel undermined, and citizens complain that formal avenues are slow and expensive. This has given rise to dangerous extrajudicial measures, most alarmingly the continued use of "land guards." Despite being outlawed by the 2020 Land Act, the practice of hiring armed men to intimidate rivals or enforce one's claim persists in Dome's most contentious disputes. Both interviews and secondary reports note that rival claimants employ land guards to seize land or terrorize occupants, leading to violence. For example, local media recounted a recent clash in the Dome Pillar 2 area where armed land guards demolished structures and displaced over 60 residents, including children and pregnant women, amid an ownership tussle (Joannides, 2023). Such incidents underscore how tenure insecurity can escalate into physical insecurity, threatening lives and livelihoods. Scholars similarly warn that where formal enforcement is weak, "might makes right" tends to fill the vacuum (Asafo, 2022; Ehwi & Asafo, 2021). The persistence of landguardism in Dome reflects the desperation to secure property in a context of weak rule of law. It also reinforces calls for hybrid governance models that combine state authority with local legitimacy to prevent violence (Ehwi & Asafo, 2021).

In summary, the findings for sub-objective 1 portray a community caught between customary tenure traditions and emerging formalization pressures, leading to overlapping claims, frequent disputes, and uneven tenure security. Dome's experience epitomizes the challenges described in the literature on African urban land governance: legal pluralism without integration creates loopholes for conflict (Salifu et al., 2019), rapid urbanization commodifies land and strains customary land governance (Asafo, 2023), and formal institutions have yet to provide accessible, trusted alternatives (Ghana Audit Service, 2023). Ultimately, the evidence from Dome underscores why tenure security must be understood as more than a title deed, it is embedded in social relations, power dynamics, and the credibility of land governance. Strengthening tenure security in such contexts requires bridging the gaps between informal practice and formal law. This sets the stage for analyzing LADM's applicability as a bridging tool, and for crafting a model that can enhance security by integrating Dome's dual land governance setting.

## **6.2. Applicability of LADM to Dome's Tenure Context and Needed Adaptations**

The analysis of land governance practices in Dome reveals fundamental misalignments between the standardized structure of the Land Administration Domain Model (LADM) and the lived, socially embedded tenure practices in peri-urban Ghana. Although LADM offers a promising framework for organizing complex land rights, its conventional application assumes formalized, individually documented tenure, a reality that does not reflect the communal, undocumented, and frequently contested landscape of Dome. This section discusses the two subsections that emerged from the data and their implications for adapting LADM in pluralistic contexts

### **6.2.1. Mismatch Between Standard LADM and Local Reality:**

The Land Administration Domain Model (LADM) provides an internationally recognized data model for recording people-to-land relationships in a standardized way (Lemmen et al., 2015). However, a key finding of this study is that applying LADM in Dome's current tenure context would be problematic without significant adaptations. LADM's standard structure presumes a cadastral paradigm, clearly defined parcels, formalized rights (ownership/lease), documented transactions, and unique party identifiers, conditions that scarcely exist in Dome's informal environment. As noted earlier, oral agreements and unwritten customary allocations dominate Dome's land tenure system. By default, LADM has no class or attribute to represent a purely oral land right that lacks a written deed or title; it "does not accommodate undocumented or oral land rights" which form the basis of thousands of transactions in places like Dome. This gap was emphasized by respondents from both the community and local institutions: "Most people just get a piece of land from their uncle or the chief. No papers. Just verbal agreement and witnesses," explained one resident. If we attempted to map Dome's current tenure data directly into LADM without modification, huge swaths of socially legitimate tenure would simply be "invisible" in the model. The literature on the continuum of land rights argues that data models must accommodate various forms of evidence and rights, not just formal titles (UN-Habitat, 2012; Zevenbergen et al., 2013). Our findings strongly support this view: as one

family head warned, “If LADM only accepts official government documents, most people will be excluded”. Therefore, the applicability of LADM in Dome hinges on its flexibility to record informal tenure evidence and nested customary claims.

Another issue is the prevalence of overlapping and disputed claims, which complicates LADM’s assumption of unambiguous rights. In a clean LADM implementation, each spatial unit (parcel) can be linked to parties holding rights, restrictions, or responsibilities, ideally one definitive record per right. In Dome, by contrast, we documented multiple instances of “one land, two sellers” and contested ownership, which would result in conflicting entries if naively input into a database. For example, a plot might have one Customary record (in a CLS ledger) indicating Family X allocated it to Person Y, and another Statutory record (at Lands Commission) where Person Z registered title to that same plot. Currently, these records are not interoperable, the CLS’s manual records are not linked to the national land registry. LADM can conceptually handle multiple claims (through overlapping interests or disputed status), but doing so requires integration of data from both sides. In Dome’s case, the lack of integration between customary and formal land databases is a structural barrier to LADM implementation. The CLS confirmed that its records “are not digital... one controlled by CLS and another by the government” with no synchronization. Consequently, even if the CLS documents a land allocation, the state treats that land as unrecorded until a formal registration occurs. This duplication (or omission) of data leads to the very overlaps and conflicts that break the integrity needed for a unified model. Researchers have noted similar problems elsewhere in Ghana and Africa; for instance, Chimhowu (2019) describes how dual recording systems create “data shadows” where informal claims aren’t seen by formal authorities, enabling multiple sales. Any LADM-based solution for Dome must therefore tackle interoperability, technically and institutionally, between the customary records and the statutory registry.

### 6.2.2. Insights on Necessary Adaptations

Our interviews with technical experts, customary authorities, and land administrators generated a clear message: LADM’s core design is sound as a framework, but it requires localization to reflect Dome’s socio-cultural tenure norms. Several concrete adaptation needs emerged from the data:

#### 1. Recognizing Group and Family Rights:

LADM’s default “Party” concept typically represents individuals or legal entities (ISO 19152:2012, Clause 6.3.2; ITC Booklet, p. 21). Yet in Dome, land is very often owned or controlled by family groups rather than single persons. Family land may be held collectively, with a family head as a trustee figure. As one CLS officer put it, “Land in Dome is typically not owned by one person... it’s owned by the family. Even if it’s one person’s name on paper, decisions are made by the family head or elders”. This reality challenges the individual-centric model of formal titling (and by extension standard LADM profiles). The literature on legal pluralism and customary tenure (e.g. Kasanga & Kotey, 2001) likewise notes that Western land administration systems often overlook collective ownership traditions. To bridge this, respondents suggested creating an extension in LADM for a “Family/Clan Party” or a *group ownership type*, allowing multiple individuals (or a lineage group) to be registered as holding a joint interest. Such an adaptation would make the model more representative of Dome’s dominant tenure form. It aligns with approaches in other contexts, for example, some countries have added “tribe” or “community” party types in their LADM-based country profiles to accommodate customary groups (Zimbabwe’s draft LADM profile, per Deininger & Augustinus, 2020). Without this, as stakeholders warned, the model would fail to capture shared land rights and could even worsen tenure insecurity by oversimplifying ownership to one name. In short, acknowledging communal and family tenure in the data schema is essential for LADM’s local relevance (see also LA\_GroupParty, ITC Booklet, p. 22).

#### 2. Incorporating Informal Evidence of Rights:

Another critical adaptation is to allow non-conventional evidence types to be recorded in the model. Dome’s landholders often possess some proof of transactions, not a title, but perhaps a sale receipt, an allocation note from a chief, or an entry in a family land book. While such documents are not legally recognized by the Lands Commission, they carry weight in the community and in disputes. Our respondents proposed that LADM be extended with an attribute for “Evidence Type” or a similar mechanism to classify the source of a claim. This could mean enumerating various modes of evidence (e.g. oral testimony, witness affidavit, customary allocation paper, family receipt) as valid inputs in the LADM (even if flagged as “informal”). By doing so, the model can document the continuum of land rights, from strictly informal to formalized, within a single framework. This idea mirrors the Social Tenure Domain Model (STDM), a pro-poor adaptation of LADM, which explicitly allows recording of narrative and community evidence of land rights (Augustinus, 2010; GLTN, 2012). The sentiment “We have our records in the family book or some chief’s endorsement” followed by “if LADM only accepts official documents, most people will be excluded” encapsulates why this change is needed. By accepting a broader range of evidence, an LADM-based system in Dome could gradually integrate informal rights into a formal schema, rather than forcing an all-or-nothing jump to formal title. This is in line with the continuum of land rights approach, which advocates interim forms of recognition (UN-Habitat, 2017). Of course, the model would need to distinguish these informal evidence-

based rights from legally registered rights, perhaps by attributing a confidence level or “informal” status, but their inclusion is vital for completeness and for building trust with the community.

### 3. *Capturing Dispute Resolution and Tenure Dynamics:*

Standard LADM focuses on static relationships (who owns what right to which parcel), typically captured in classes such as LA\_RRR and LA\_BAUnit (ISO 19152:2012, Clauses 6.3.3–6.3.4; ITC Booklet, p. 24–27), but in Dome the processes and temporality of tenure are equally important. A notable suggestion from interviewees was to incorporate a notion of dispute or conflict resolution records into the model. Currently, LADM has no explicit class for disputes, yet in places like Dome, knowing whether a parcel is under dispute or how a past conflict was resolved is key information for governance. Several participants (including a legal expert and CLS staff) recommended adding a “DisputeRecord” or “ConflictResolution” entity that could log ongoing disputes, the forum (e.g. chief’s arbitration, court case) and outcomes. This addition would allow the land administration governance to track the life cycle of rights, not just their existence. For example, if a family land sale is contested, the model could flag that parcel as “under dispute, pending arbitration by clan elders,” alerting any prospective buyer or official. Once resolved (say the elders or court decide the rightful owner), the outcome could be recorded and linked to the right in question. Including dispute mechanisms acknowledges the reality that tenure security is a process, maintained (or lost) through conflict and resolution, not a one-time event. It would also enhance public trust in a new system: people would see that their customary dispute processes have a place in the official record, addressing the concern that the model must “capture how we resolve things, not just who owns land” (CLS officer’s viewpoint). Similarly, respondents highlighted that rights in Dome are often temporal or conditional, changing with events like inheritance, marriage, or migration. For instance, someone may be a caretaker of land only until the true owner returns, or a widow may hold land in trust for her children until they come of age. To reflect these nuances, LADM’s temporal attributes should be emphasized and perhaps extended (ISO 19152:2012, Clause 6.3.3; ITC Booklet, p. 24–25). Our findings suggest the need to record start and end dates of rights, life events affecting tenure (death of family head, etc.), and conditional clauses (e.g. “Person X may use the land until Y happens). Integrating these temporal dimensions would allow the LADM to model evolving tenure relationships rather than just fixed ownership, a feature critical for a community like Dome where land arrangements are seldom permanent. This resonates with Simbizi et al. (2014), who argue for incorporating perceived tenure security factors and time-based interests into land information systems for Sub-Saharan Africa’s dynamic contexts.

### 4. *Community Participation and Verification:*

A recurring theme, both in literature and our field data, is that any formalization effort must engage community actors to succeed (GLTN, 2018; Barry & Kingwill, 2020). In Dome, stakeholders proposed embedding a community validation step into the LADM-based workflow. Practically, this means before a land right is officially registered, it should be vetted by local authorities or the community to confirm its legitimacy. One interviewee described it as a “Verification Phase” where “family and community verify before registration”. This could involve the CLS checking that the seller truly has the family’s consent or convening a community meeting for neighbours to affirm boundary agreements, prior to encoding the information in the formal database. Including such a step in the model’s implementation process would address the trust gap identified: people currently distrust formal registration because it can be done unilaterally, undermining customary consent (Asafo, 2020). By institutionalizing community verification, the model aligns with participatory land governance principles and legal pluralism, ensuring that customary protocols are honored even as data is formalized. Technically, LADM can accommodate this by linking a “verified” flag or a transaction state that requires a CLS officer’s endorsement (ISO 19152:2012, Clause 6.3.6; ITC Booklet, p. 30–31). The concept is analogous to the Social Tenure Domain Model’s participatory mapping exercises, where community members help map and validate each other’s land claims (GLTN, 2021). Our participants believe this hybrid approach, “a workflow where both systems are respected and involved”, is crucial so that the new model is seen as legitimate. In essence, it’s an adaptation not just to the data schema but to the governance process: bridging customary and statutory modes of verification.

Considering these insights, we see that the LADM’s potential to bridge formal and informal tenure can only be realized if it is localized to capture Dome’s complex tenure reality (Arhinful, 2021; Enemark et al., 2014). Past efforts to implement LADM in Africa have shown that a rigid application will fall short, for example, Namibia’s pilot had to extend community tenure types, and Kenya’s initial country profile needed revision to include customary trust lands (Kalantari et al., 2017). Ghana’s own attempts at land administration reform (e.g. the Land Administration Project and new Land Act 2020) have yet to yield an integrated data model that covers customary tenure in peri-urban areas. Our findings contribute empirical evidence of what such a model must entail for a community like Dome. In summary, LADM *can* be applicable as a foundation, but only if we adapt it to allow group rights, informal evidence, dispute records, temporal flexibility, and community input. These requirements directly inform the next sub-objective, the development of a conceptual model for Dome, and they echo key concepts from the literature such as the Continuum of Land Rights model and the need for adaptive land administration in pluralistic contexts (Zevenbergen et al., 2013; Augustinus, 2010). By addressing the gaps

identified (or, in design terms, by “extending LADM” to fit local needs), a more inclusive system that could improve tenure security in practice can be realized.

### 6.3. Developing a Localized LADM-Based Tenure Model for Dome

This objective aimed to develop a localized conceptual model based on the ISO 19152 Land Administration Domain Model (LADM), capable of structurally representing the complex land tenure arrangements in Dome, a peri-urban area characterized by overlapping, undocumented, and socially governed land rights. The aim was not to replicate formal land administration models but to contextualize and extend the LADM schema to accommodate customary, informal, and dynamic tenure patterns that dominate Dome’s land landscape. This discussion outlines the theoretical rationale, architectural structure, functional logic, and practical implications of the model.

#### 6.3.1. Overview of the Proposed Model:

Guided by the above findings, the study developed a conceptual land administration model tailored to Dome, essentially a localized extension of LADM that represents the community’s tenure arrangements more faithfully. The model’s design incorporates new classes and relationships to handle the entities, tenure types, and social processes prevalent in Dome. At its core, the model retains LADM’s fundamental classes: Party (people or groups), BAUnit, spatial units (like land parcels), and RRR (rights, restrictions, responsibilities). However, we introduced specializations and attributes under these to align with Dome’s customary context:

1. Under Party, we revised the group party, for “Family/Clan Group” to be as capture collective ownership. This allows a land parcel to be linked to a family entity (with multiple members) as the landholder, instead of only individual parties. For example, a parcel could have a Party of type “Family X” which is defined by a list of members and a head. This directly models scenarios where land is considered family property. It also supports multi-party rights, where more than one person or group shares an interest in the same land (e.g. co-heirs or overlapping customary and lease rights). We also extend LADM’s party model to include roles like “Family Head”, “Elder”, “Chief”, “Caretaker”, “Witness”, etc., in relation to a BAUnit or transaction. For example, the family head could be designated as the administrator of the family group land (with a responsibility to manage it on behalf of others). A “Caretaker” role can be noted if someone is looking after land for an absent owner, as in the case from the focus group, so that any third party checking the records understands the caretaker is not the owner. The literature on the continuum approach supports such representations; as (GLTN, 2012) notes, data models should enable group rights and nested interests to reflect reality. In our model, a “Family/Clan” party can be linked to a right with a specified share or role (e.g. all members have use rights, the family head has allocation authority). This adapts the LA\_GroupParty class of LADM, which allows a party group with members and their roles (ISO 19152:2012, Clause 6.3.2.2; ITC Booklet, p. 22).
2. Gender of Parties: We add a simple attribute (e.g., Party.gender) for individual parties. This allows the proposed model, system to record whether a land right is held by a man or a woman (or jointly), enabling analysis of women’s participation. Over time, queries could reveal, for example, how many properties are registered to female parties or if women are included in group ownership. This addresses the observed gender gap by making it visible. If a family group party is registered, the list of its members (with genders) can show if women family members are included as parties. Moreover, if a woman’s name is absent where it should be (say a widow’s name missing from a family group after her husband’s death), the data could flag an inconsistency. While gender may not affect the legal validity of a right, including it as descriptive metadata aligns with the thesis goal of highlighting women’s exclusion (resident 6), and it can support future reforms (e.g., policies to ensure women co-sign documents could be monitored via this data).
3. For tenure types (RRR), we extended the code list of right types beyond freehold/leasehold to include customary tenure categories identified in Dome. This includes rights like “Customary Occupancy,” “Inherited Family Right,” “Caretaker Right,” and so forth. These mirror what community members described: some occupants don’t own the land outright but have long-term use permission from the family, and some have *abunu* or *abusa* arrangements (sharing output or proceeds with the landowner). By coding these as recognizable tenure forms in the model, we acknowledge the spectrum of informal rights that exist. Additionally, we added an attribute for “Evidence Type” associated with each right (as suggested by respondents). This attribute records how that right is substantiated, for

instance, “Oral Tradition,” “Witnessed Agreement,” “Chief’s Letter,” “Registered Title,” etc. A right marked as “Customary Occupancy, Evidence: Oral” would denote a purely informal claim, whereas “Leasehold – Evidence: Land Title Certificate” would be a formal claim. This innovation aligns with the Social Tenure Domain Model philosophy, which allows flexible evidence (Augustinus, 2010) and ensures that informal rights are not excluded but explicitly documented in the system. Notably, making informal claims visible in the model can help integrate them over time: for example, a future program could systematically upgrade evidence types (from oral to recorded affidavit to surveyed title) without losing the continuity of the record. Our model therefore supports the idea of incremental tenure security, something scholars have argued is more realistic than sudden full titling (Payne et al., 2009). This builds upon the LA\_RRR class and its codelist LA\_RRRType (ISO 19152:2012, Table 17; ITC Booklet, p. 24), extending the model’s flexibility to include informal and customary claims.

4. In terms of Spatial Units, the model remains parcel-based but with allowances for the quality of spatial data. Given the lack of formal survey in Dome, we foresee using general boundaries or community mapping outputs as the geometry for parcels initially. We include a flag for “boundary accuracy” or source, distinguishing official surveyed boundaries from community-agreed ones. This corresponds to the Flexible Boundary concept in pro-poor land tools (GLTN, 2016). For instance, a parcel could have a polygon drawn from community participatory mapping with an attribute “Boundary Source: Community Sketch, Not Surveyed.” Such a parcel is still recognized, but with caveats on its precision. Incorporating this flexibility is essential; as our findings show, many boundary definitions in Dome are currently narrative (e.g. “along the footpath”). The model can store these descriptions or approximate sketches, which could later be updated if a formal survey occurs. Crucially, by registering even imprecise spatial units with local acknowledgment, the model creates a baseline record to prevent total overlaps, everyone would at least see that a particular plot is claimed and roughly where it is, reducing the chance of inadvertent encroachment or duplicate allocation. This feature implements the continuum of land rights principle that even non-cadastral information is better than nothing, and it can be progressively improved (UN-Habitat, 2017). These adaptations are built upon the LA\_SpatialUnit class (ISO 19152:2012, Clause 6.3.5; ITC Booklet, p. 28–29).
5. We introduced a “Dispute/Conflict” class linked to both Parties and Spatial Units, to log any disputes associated with a parcel or a claimant. This class stores information such as dispute type (inheritance, boundary, etc.), parties involved, dispute resolution steps taken (customary arbitration, litigation), and outcome/status. For example, Parcel A could have an active DisputeRecord indicating “Boundary conflict between Family X and Neighbor Y, under mediation by elders.” If resolved, the record can note the resolution (e.g. boundary adjustment agreed). This ensures the model is not a static snapshot but captures dynamic tenure processes, increasing its value for governance. It can alert officials to hold off on issuing titles until disputes are cleared and preserve a history of how conflicts were settled, which is useful for precedent and fairness. By embedding dispute information, the model explicitly integrates conflict resolution mechanisms, something practitioners have called for to make land administration more responsive to real social processes (Wehrmann, 2008). Our data strongly indicated that ignoring the dispute aspect would render any system irrelevant to locals, as “the model must capture it [the customary dispute process]”. Although the LADM does not define a DisputeRecord class natively, this proposed class is an extension compatible with LADM’s extensibility principles (ISO 19152:2012, Clause 6.2; ITC Booklet, p. 8–9).
6. Another key feature is a “Verification Workflow” built into the model’s use. While this is partly a procedural element outside the data model per se, we designed the concept of a Customary Verification Step as a formal part of registering rights. In implementation terms, this could be represented by a status attribute on a right or transaction (e.g. “Pending CLS Verification” vs “Verified by CLS” vs “Fully Registered”). The model foresees that when a new land right claim is entered (say, a family selling a plot to a buyer), the claim would first be recorded with a status of pending, then route to the CLS or community representatives for validation. Only after the customary authorities confirm the legitimacy (e.g. check that the seller indeed has the right to sell and family members consent) would the claim be finalized and attain “registered” status with the Lands Commission. This two-tier validation is reflected conceptually in the model by linking community approval data (like minutes of a family meeting or a CLS officer’s endorsement) to the transaction record. The outcome is a blended governance model: neither the community nor the state acts in isolation, but rather in sequence and collaboration. This responds directly to the trust issues identified, it operationalizes the idea that participatory governance can be codified in land administration (as advocated by the VGGT guidelines and scholars like Alden Wily, 2022). By securing local buy-in at the data entry stage, the model increases its legitimacy and the likelihood that people will use it. LADM accommodates transaction lifecycle management through its LA\_AdministrativeSource and LA\_AdministrativeUnit concepts (ISO 19152:2012, Clauses 6.3.6–6.3.7; ITC Booklet, p. 30–31), which can be extended to represent staged or verified processes.
7. Consent and Transaction History: In addition to the real-time “consentStatus” on rights mentioned earlier, it is useful to log the history of consents and transactions. It is propose adding a custom class, perhaps

FamilyConsentRecord, which is a kind of administrative source document that gets attached to the BAUnit whenever a family land sale occurs. This record would list who in the family agreed (signatures or at least names) and who, if anyone, dissented. Over time, this builds a consent audit trail for that piece of land. If, later, a family member claims she never agreed to a sale, one can refer to this record. These classes don't change the rights per se but enrich the information. They can include fields like date, nature of meeting, outcomes, etc., and be linked to parties (e.g., an outcome might elevate a woman's status from excluded to include if a dispute settlement says she gets a portion).

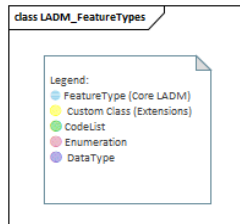


Figure 20 The legend showing that the colours of the various part of the

As illustrated in Figure 20 (Model Legend), the model distinguishes clearly between LADM core classes (FeatureTypes) and customized extensions (Custom Classes) in yellow as seen in figure 21.

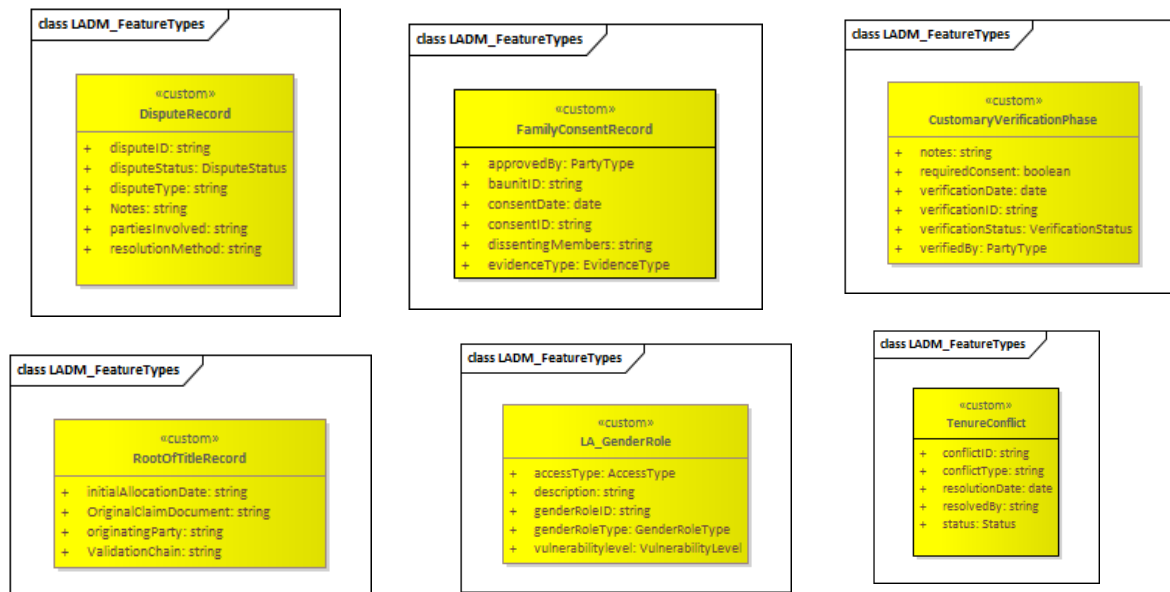


Figure 21 These newly extended custom classes marked in yellow.

Table 2 Showing the Custom Extensions and Where They Derived.

Custom classes	Inherited from	Justification/Expectations
FamilyConsentRecord	LA_AdministrativeSource (subclass of LA_Source)	Represents documented or witnessed decisions within families, an administrative form of evidence. Or lineage-based contexts.
DisputeRecord	LA_AdministrativeSource / LA_SpatialSource	Represents records of contestation, treated as administrative or spatial annotations tied to land parcels or parties.
LA_GenderRole	LA_Party	Captures roles and rights of gendered individuals in landholding, fits within LADM's structure for party attributes.
TenureConflict	LA_BAUnit extension	Could be modeled as a status or state subclass for a basic administrative unit (BAUnit) or as a new meta-class capturing layered conflict metadata.
CustomaryVerificationPhase	LA_Source	supports the idea of social legitimacy preceding statutory recognition.

RootOfTitleRecord	LA_Source	As a form of customary validation, this represents social legitimacy prior to state registration, treated as a type of source evidence.
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The model's Enumerations provide controlled vocabularies that ensure data consistency and enable standardized representation of complex, culturally specific terms. Key examples can be seen in Figure 22. Similarly, CodeLists (Figure 23) below, are vital for capturing for like Localized RightTypes, Varied EvidenceTypes, BoundaryTypes, OwnershipModes. etc

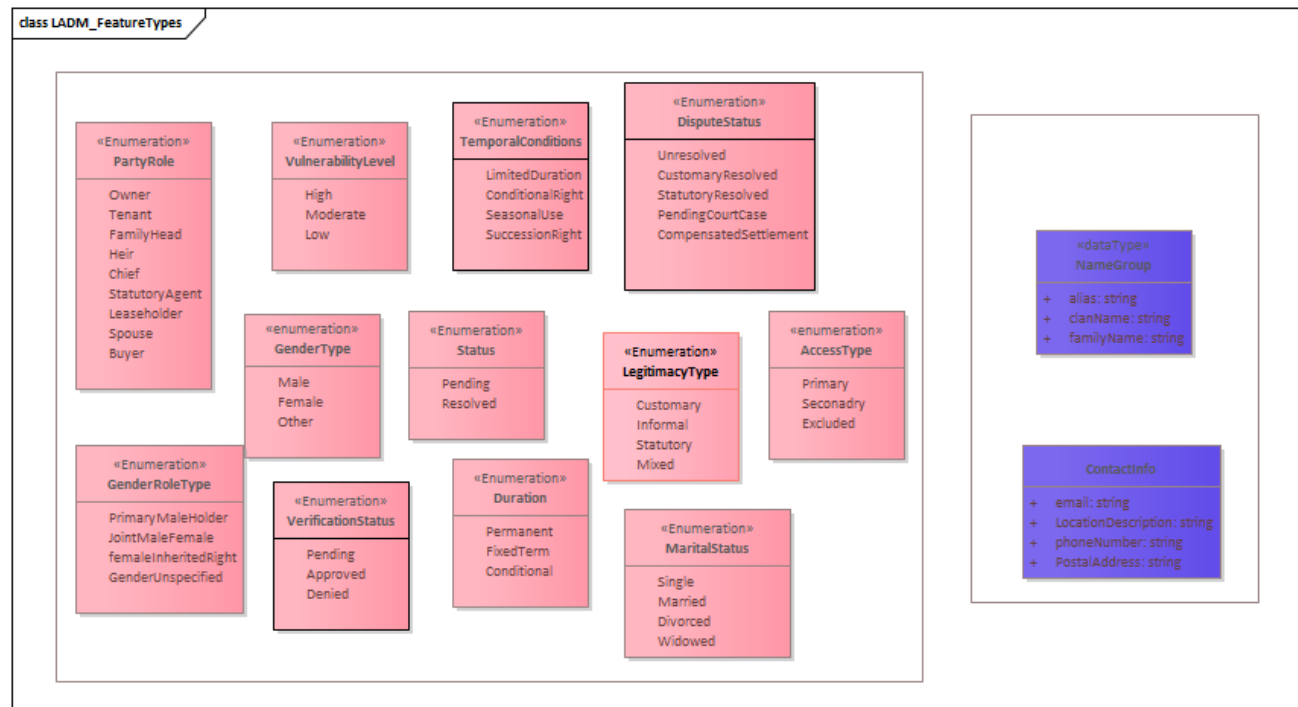


Figure 22 The extended enumerations and data type, to help in the capturing of the social tenure dynamics

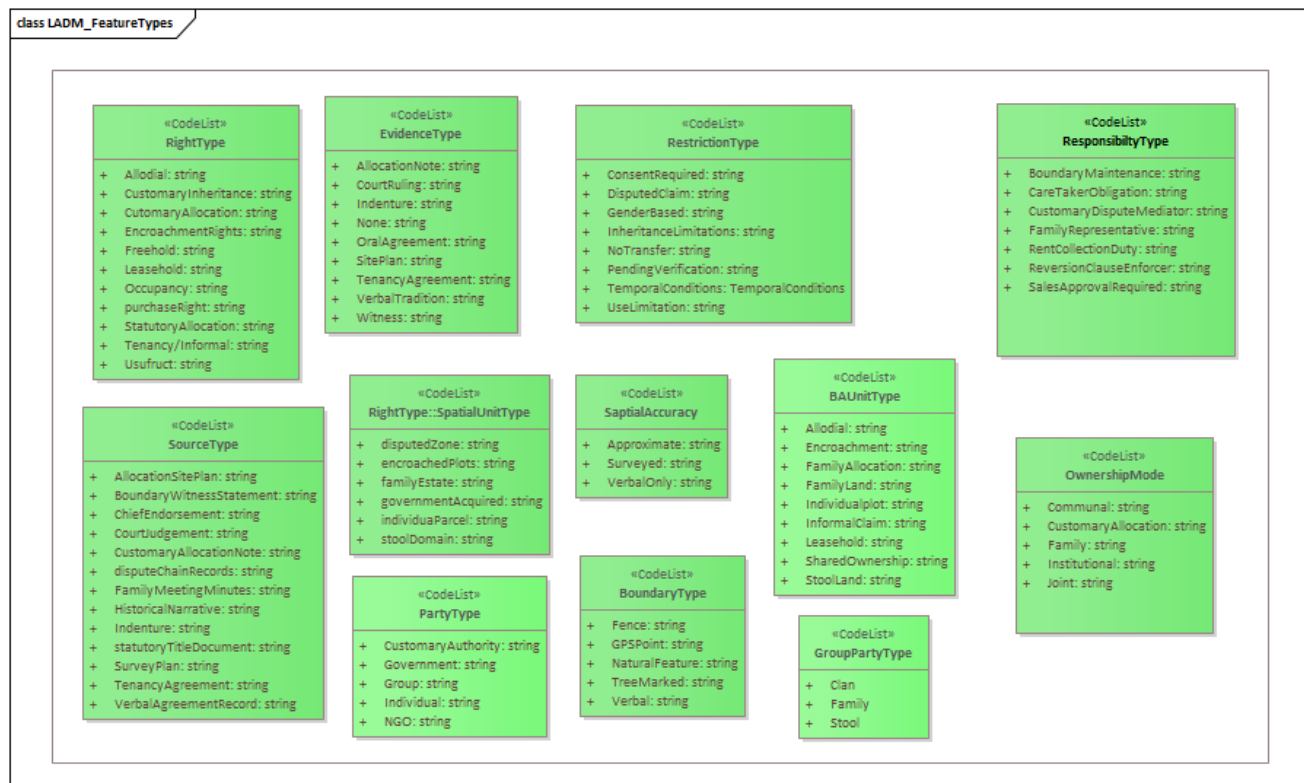


Figure 23 The extended codelist, to help in the capturing of the social tenure dynamics

To support the design of the localized model, we relied on the core LADM classes, each serving a specific function in representing land administration data. Table 3 summarizes these core classes and their relationships, outlining their roles within the data structure.

Table 3 The core LADM classes and their relationships, explained briefly.

Core LADM	Functionality
LA_SpatialUnit	describes land parcels and includes fields such as areaSize, conflictFlag, boundaryType,
LA_Party	captures individuals, groups, families, or authorities involved in landholding and includes attributes for contact info, customary affiliation, marital status, and role type.
LA_RRR	(Rights, Restrictions, Responsibilities) encodes the relationship between parties and spatial units, with attributes to specify rightType, duration, responsibilityType, and restrictionType.
LA_BAUnit	groups rights over a land unit and introduces fields like ownershipMode and evidenceType.
LA_Source	documents the origin or proof of a legal or social claim, linking the abstract data structure to verifiable records. It is related to other classes primarily through the LA_RRR (Rights, Restrictions, Responsibilities) and LA_BAUnit classes.

At the heart of the model are the core FeatureTypes, shown in Figure 24. These components, working together, establish a comprehensive structure for modelling layered, conditional, and overlapping tenure, precisely the conditions observed in Dome

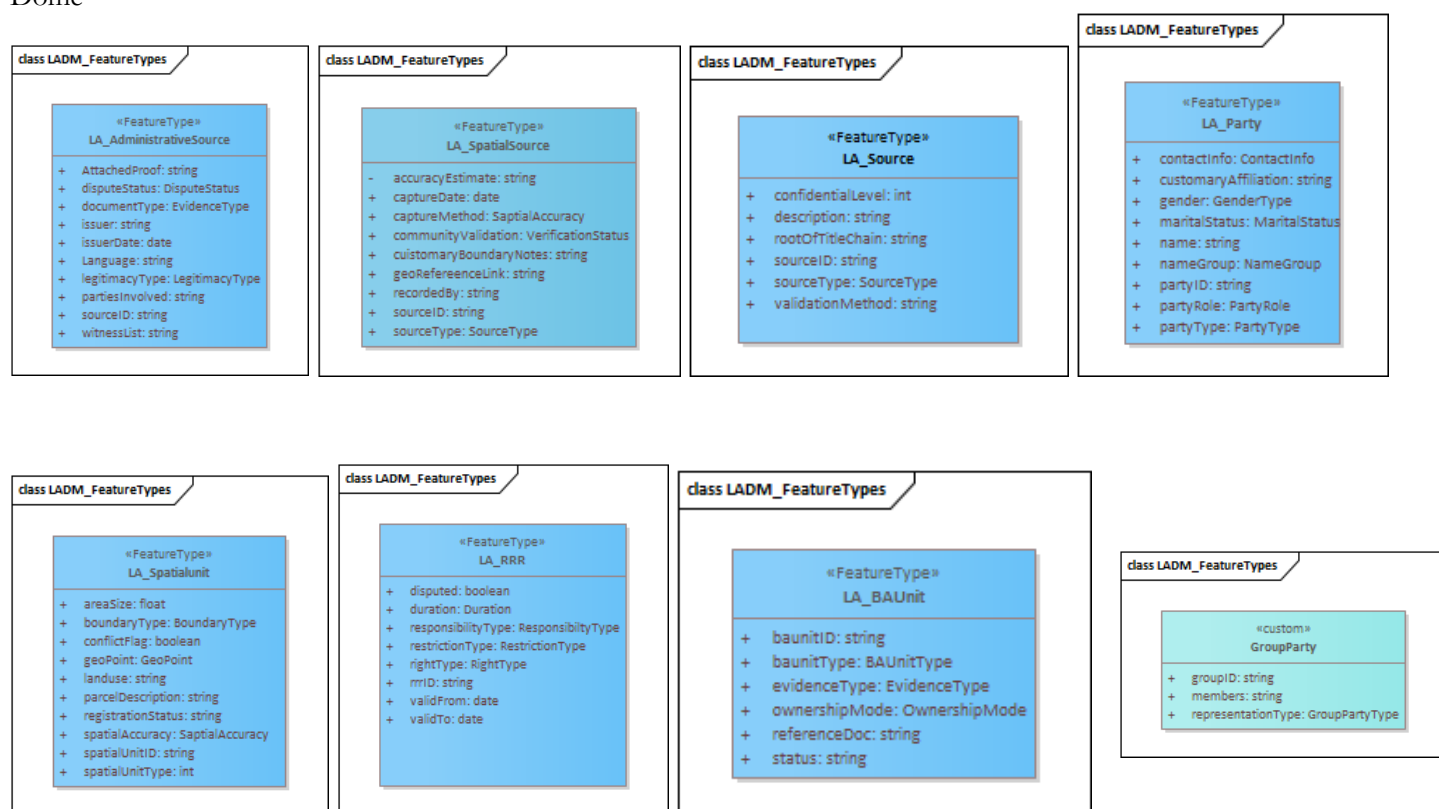


Figure 24 The core LADM showing more extensions (adjustments) made, using the enterprise architect tool.

By transforming undocumented land rights into data points with structured attributes, the model lays the groundwork for pro-poor, inclusive land administration, aligning with principles of tenure security and the Fit-for-Purpose Land Administration (FFPLA) approach.



### 6.3.2. Addressing Tenure Security and Integration:

The proposed model is more than a technical schema, it is designed to strengthen tenure security and reduce land conflicts in Dome. By documenting informal rights and making them visible to formal institutions, it addresses the current information gap that allows fraud and disputes. For instance, recording that Family Z holds an “Inherited Family Right” to Parcel 123 based on a CLS allocation paper would help prevent double sales or encroachment. Formal institutions, like the Lands Commission, could flag such entries, offering protection even to informal rights holders. This aligns with the continuum of land rights approach, offering incremental recognition for those lacking formal titles (Chimhowu, 2019).

The model also safeguards customary tenure by enabling group rights. A “Protected Family Land” category, for example, could require consent from all adult family members before sale or division, enforced through verification workflows or system constraints. This prevents unauthorized sales and internal family disputes. Thus, the model not only reflects tenure realities but promotes better governance by reinforcing collective decision-making. It reflects the idea of integrated land governance, where formal systems adapt to customary norms (Enemark et al., 2014).

Built on the LADM framework, the model supports interoperability with national systems like GELIS and Lands Commission databases. All custom elements align with standard LADM classes, e.g., mapping “Family/Clan” to LA\_Party, or dispute records to LA\_Source, ensuring scalability and integration. This makes Dome’s model a potential prototype for broader application in Ghana, supporting national efforts to develop a localized LADM profile (Arhinful, 2021). Similar to STDM pilots in Uganda and Namibia, structured local data can be progressively integrated into formal registries (GLTN, 2021).

The model’s development was participatory and iterative, co-produced with stakeholders from Dome. Its features, family parties, evidence types, dispute records, directly respond to local concerns, increasing legitimacy and usability. This bottom-up, empirically grounded approach is rare in land administration. By operationalizing legal pluralism and the continuum of rights through LADM, the model bridges formal and informal systems in a practical, scalable way (Barry & Augustinus, 2016). The next section explores how stakeholders received the model and what it implies for implementation in Dome and similar contexts.

## 6.4. Validation of the Model and Implications for Policy and Land Governance

### 6.4.1. Stakeholder Validation Outcomes:

After developing the conceptual model, the study returned to key stakeholders, including CLS officials, Lands Commission staff, family heads, and land experts, to validate the model’s fit with Dome’s realities (sub-objective 4). The feedback was overwhelmingly positive regarding the model’s relevance and potential impact. Participants generally agreed that the model captures the essential elements of Dome’s land tenure practices and could address many of the problems identified in the current land governance. For instance, Lands Commission representatives acknowledged that incorporating customary records and community validation in the workflow would likely reduce the incidence of false or overlapping claims reaching their office, thereby cutting down on litigation and registration disputes. Customary authorities, in turn, appreciated that the model did not bypass them but rather elevated their role (through the verification step and inclusion of family rights), which they felt would protect customary landowners’ interests in any formalization process. This mutual recognition suggests the model can enhance institutional alignment, fostering cooperation instead of competition between customary and statutory bodies. An important finding from validation was that experts saw the model as technically feasible to implement, but contingent on certain supports. The Lands Commission’s IT specialists noted that since Ghana is already moving toward a digital cadastre (e.g., through programs like Land Information System upgrades), adding the new data fields and classes from our model is plausible. The challenge, they said, is not as much the software as the data collection and change management: capturing reliable customary data will require effort, and staff will need training to handle the new categories (like recording an “oral evidence” claim properly).

### 6.4.2. Challenges and Considerations for Implementation:

Several practical challenges were raised during validation that have implications for policy and practice:

#### 1. Capacity and Resources:

CLS officials pointed out that their current capacity is limited “Most of us are not trained in GIS or database management, and that’s a problem if LADM is going to require digital systems”. Indeed, a major concern is whether local offices have the skills and equipment to maintain a digital record registry. This reflects the broader issue that customary institutions often lack resources (Simbizi et al., 2014; Marfo et al., 2012). To implement the model, significant investments in capacity building will be needed: training CLS staff in basic surveying/mapping, data entry, and record management. It may also require hiring or assigning *liaison officers* to facilitate data flow between CLS and Lands Commission. Policymakers must acknowledge this and allocate funds (for example, under the Lands Commission’s outreach programs or international land governance support projects) to upgrade the technical infrastructure at the community level. Without bolstering local capacity, the model’s sophisticated design could falter in execution.

## 2. *Legal and Institutional Framework:*

For the model to function, certain legal provisions may need adjustment. Currently, as stakeholders noted, the Lands Commission does not formally recognize customary allocation papers or the CLS’s manual records. While the Land Act 2020 made some advances (like requiring stool land allocations to be documented and in some cases, for CLS to record them), it still largely treats the Lands Commission as the final authority. Implementing our model likely requires formalizing the status of CLS records, for instance, a policy or regulation that any land registration in a customary area must include a CLS verification certificate. This could be achieved through Lands Commission directives or amendments to regulations under the Land Act. The “customary verification step” could thus be codified as part of the official registration procedure in Dome (and potentially other areas), giving it legal teeth. Additionally, the notion of group rights or family ownership may need clearer legal definition. Ghana’s laws do recognize group ownership in the form of stools/skins and families, but registration practice tends to individualize titles. Creating something like a “Protected Family Land” designation might require a legal instrument so that, for example, the Lands Commission can register a family as a legal person or record multiple people as joint owners without fractionalizing shares. Policymakers might consider piloting this under customary law provisions or trust law. The validation discussions highlighted that inter-agency collaboration is critical, the Office of the Administrator of Stool Lands (OASL), which oversees CLS operations, and the Lands Commission would need a memorandum of understanding or integrated workflow. Institutional buy-in at high levels (e.g. the Ministry of Lands and Natural Resources) would accelerate these changes, linking grassroots model innovation to top-down support.

## 3. *Community Acceptance and Equity:*

From the community perspective, participants stressed that adoption of the model will depend on trust and perceived benefits. There is still wariness among some residents about anything that resembles formal registration, due to fears of taxes, loss of control, or exposing their land to government radar. To overcome this, an awareness campaign would be needed to communicate how the new proposal works and how it protects land rights rather than threatens them. For example, explaining that recording an informal right in the LADM does not mean the government is seizing the land, but instead could help prevent others from claiming it, would address common fears. Showing quick wins, like resolving a known boundary dispute through community mapping and having both sides sign off in the new register, could demonstrate the model’s usefulness. It’s also important that the process be inclusive: our findings noted that poorer residents, migrants, and women often struggle with the formal land governance (due to cost and bias). If the new model simply digitizes existing power imbalances (e.g. only wealthy or connected individuals bother to register their claims), it could worsen inequities. To counter that, the implementation plan should include support for vulnerable groups, such as fee waivers or subsidized surveying for low-income families, legal aid for women to validate marital or inheritance claims, and tenant education on their rights. Encouragingly, the CLS and local leaders in Dome expressed willingness to use the model to document not just landowners but also long-term tenants or sharecroppers in some fashion, which could give those groups more security (even if they are recorded as having a lesser right, at least it’s acknowledged). This aligns with the participatory and pro-poor ethos of tools like STDM, which have been used to map occupants in slums for upgrading projects (GLTN, 2018).

## 4. *Data Privacy and Misuse Risks:*

An important caveat noted (and seen in our research ethics) is that documenting informal arrangements could potentially expose people, if not handled carefully. A registry of all untitled land could be misused by unscrupulous officials or elites to identify targets for land grabbing or to enforce regulations punitively. During validation, a legal expert advised that safeguards be built in. This might include classifying certain sensitive data as confidential (accessible only to the community and not public) or implementing a moratorium such that any newly documented customary claim is temporarily protected from eviction or expropriation by the state. Essentially, the community needs assurance that sharing information will not make them worse off. Policymakers could, for example, declare an amnesty period where people can register informal rights

without penalty or fees, to encourage participation (like how some countries implemented land formalization by pausing land taxes initially). The model's success thus depends not only on technical design but also on policy measures that create a safe environment for informal rights to come forward.

#### Implications for Land Governance:

If implemented, the Dome LADM-based model could have significant implications for land governance at both local and national levels. Locally, it promises to greatly enhance transparency and record-keeping. No longer would critical information about landholdings reside solely in the memories of elders or in disparate notebooks, it would be aggregated in an accessible data registry. This can improve accountability of customary authorities as well; for instance, once transactions are recorded, a chief or family head would find it harder to secretly resell land since the first sale is on record. The model could thereby help curb the malpractices that currently undermine trust (like multiple sales by different family members). It also institutionalizes conflict resolution: by formally acknowledging customary dispute processes, it may encourage their use and give them greater weight (perhaps even courts could consider evidence from the model's dispute records, lending credence to outcomes of local mediation). Furthermore, the integrated model could facilitate urban planning and services in Dome. With an inventory of land rights and occupants, authorities can plan infrastructure or regularization schemes more effectively, knowing who to consult or compensate. In many developing areas, lack of land information hampers development initiatives, the model begins to fill that gap for Dome.

At the national level, Dome's model could serve as a pilot for scaling up integrated land administration. Peri-urban tenure issues are not unique to Dome; other communities around Accra (and other cities) face similar customary/formal overlaps (Owusu Ansah, 2022; Asiama et al., 2017). A successful Dome project could inform Ghana's land policy on how to decentralize record-keeping to communities while maintaining a unified framework. It aligns well with Ghana's ongoing efforts to roll out Customary Land Secretariats and improve their functioning. In fact, our research reinforces earlier studies that recommended strengthening CLSs as the nodal points for bridging tenure practices (Marfo et al., 2012). By providing a template for how a CLS can digitally document rights in a format compatible with the national registry, this model could accelerate the integration envisioned in the Land Act 2020. It feeds into the government's agenda of moving towards a comprehensive Land Information System that includes all lands (currently, coverage is skewed to urban titled lands). Additionally, it supports international frameworks: The Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) emphasize recognizing and recording all legitimate tenure rights, including customary and informal, as a basis for tenure security (FAO, 2012). Our model offers a tangible mechanism to do exactly that in line with VGGT principles and Sustainable Development Goal 1.4.2 (which tracks secure tenure documentation). In broader terms, it contributes to the discourse on legal pluralism in land administration, demonstrating that we can move beyond viewing customary and statutory as irreconcilable. Instead, we can create hybrid models that leverage the strengths of each, the social legitimacy and accessibility of customary systems, and the standardization and enforceability of formal systems (Ehwi & Asafo, 2021).

#### Towards Participatory and Inclusive Governance:

One of the most significant implications of this work is the validation of participatory governance approaches in land administration. The study's outcomes indicate that engaging local stakeholders in the design and operation of the tenure arrangements yields a product that is more acceptable and potentially more sustainable. By giving the community a role in verification and data gathering, the model inherently promotes community empowerment. This could transform citizens' relationship with land governance from one of passive subjects to active contributors. There is evidence from elsewhere that when communities map and manage their land information (with government support), it can reduce conflicts and improve compliance with regulations, because people have a sense of ownership in the rules (Törhönen, 2016). Dome's case can add to that evidence. It also offers lessons on how to manage the socio-political dynamics of reform: rather than stripping chiefs of power (which can provoke resistance), the model repositions them as custodians and verifiers within the new system, thus aligning incentives. Chiefs maintain influence and see their roles formalized (e.g. being a required sign-off in the digital record), which could diminish their motivation to circumvent the system. At the same time, community members gain protection against abuses because the chief's actions are recorded and subject to agreed rules. This delicate balance is what "participatory governance" in a pluralistic setting looks like, co-governance by state and community.

Finally, we must acknowledge that the model is conceptual, and its true test will be in implementation. The discussion here identifies likely benefits and potential pitfalls, but real-world rollout could surface new challenges. Nonetheless, the critical, analytical examination of Dome's tenure problems alongside theoretical models have yielded a strong argument that integrated, localized land administration models are not only necessary but possible. The significance of these findings thus extends beyond Dome. They suggest a pathway for other peri-urban and customary land domains to enhance tenure security: by adopting flexible frameworks like an adapted LADM, supported by policy reform and community engagement. For

Dome, the implications are hopeful, if the recommendations are acted upon, Dome could transition from a zone of frequent land disputes and insecurity to a model community where formal and informal tenure co-exist in harmony, providing residents with greater confidence in their land rights and a more peaceful, equitable environment for development. This would be a noteworthy contribution to Ghana's land governance journey, demonstrating how global tools and local knowledge can be fused to solve longstanding tenure issues.

## 7. CONCLUSION.

This study aimed to examine the complex land tenure environment in Dome, Ghana, and to develop a localized conceptual model based on the Land Administration Domain Model (LADM) that integrates statutory, customary, and informal land rights for improved land governance. To achieve this aim, four specific objectives were pursued: (1) to explore land access, use, and tenure security; (2) to assess the applicability of LADM and necessary adaptations; (3) to develop a localized LADM-based conceptual model for Dome; and (4) to evaluate the model's fitness for practical implementation.

### 7.1. Summary of Key Findings

Land in Dome is vital for livelihoods, mostly accessed through inheritance and informal purchases. While traditional recognition gives many families a sense of security, formal documentation is rare. Disputes, such as multiple sales, inheritance conflicts, and tenant evictions, are common, often due to verbal agreements, poor records, and weak legal protections. These issues reflect broader peri-urban challenges in Ghana, where informal governance and rapid urbanization intersect with limited state enforcement. Though the LADM offers a strong base, its direct application in Dome is limited by structural and cultural factors. Many land rights remain invisible to state systems due to oral agreements and non-integrated records. Stakeholders emphasized adapting LADM to recognize collective ownership, informal evidence, and local dispute mechanisms. To address this, a localized LADM-based model was developed. It accommodates collective ownership, overlapping rights, oral/customary evidence, and dynamic tenure transitions (e.g. through inheritance). The model balances formal standards with local realities, offering a socially legitimate framework for inclusive land administration. Stakeholders from customary and statutory institutions validated the model's accuracy and practicality. They noted its potential to improve documentation, reduce conflicts, and rebuild trust in land governance. Its success, however, hinges on community-friendly tools, institutional support, and capacity building. The model is considered suitable for piloting in Dome and scalable to other peri-urban areas in Ghana.

### 7.2. Theoretical Contribution: Advancing Hybrid and Localized Tenure Models

This study contributes to theory by demonstrating how the continuum of land rights can be operationalized through a localized adaptation of the Land Administration Domain Model (LADM). While frameworks like the continuum and Fit-for-Purpose Land Administration (FFPLA) call for flexible systems (UN-Habitat, 2016; Enemark et al., 2014), real-world applications at the micro level remain limited, especially in Sub-Saharan Africa where customary norms and oral traditions dominate (Chimhowu, 2019; Alden Wily, 2022). This research addresses that gap by embedding these principles into a conceptual model tailored to Dome's peri-urban context.

The localized LADM profile developed here shows how international data standards can integrate undocumented rights, oral evidence, and social legitimacy. It supports critiques of top-down legibility (Scott, 1998) and aligns with scholars like Joannides (2023) and Simbizi et al. (2016), who argue for bridging formal-informal divides without undermining customary practices.

Methodologically, the study offers a novel approach by translating qualitative data, interviews, focus groups, and oral histories, into a formal modelling structure. This design science approach allows empirical insights to shape class modifications, advancing global discussions on inclusive, participatory data models (Lemmen et al., 2015; Kalogianni et al., 2021).

Lastly, the study redefines customary tenure as dynamic and evolving rather than static or informal. Drawing on the concept of "new customary tenure" (Chimhowu, 2019), it shows that such flexible claims can be formalized within adaptable data models, offering a scalable governance tool for other fast-urbanizing areas.

### 7.3. Practical Implications

To integrate customary tenure into formal systems, policymakers should introduce a customary consent verification step before land registration. In areas like Dome, the Lands Commission should require confirmation from the Customary Land Secretariat or family head that the seller has the right to transfer the land and that key family members agree. This would protect family rights and reduce multiple sales fraud. Legal reforms should recognize group ownership, allowing family or clan names on titles and issuing Certificates of Customary Ownership, as seen in Uganda. To encourage registration, the

government should simplify procedures, lower fees, and support mass documentation drives with donor assistance. Finally, policies should require data sharing between customary and state offices to move toward a unified land administration framework.

## 7.4. Recommendations

Building on the study's findings, several concrete recommendations can be made to improve land governance in Dome and similar contexts:

### 7.4.1. Land Policy Reform:

Policymakers should institutionalize the integration of customary tenure into statutory systems. A key step is introducing a customary consent and verification process in land transactions. Before any peri-urban land, like in Dome, is formally registered, the Lands Commission should require a certificate from the Customary Land Secretariat (CLS) or family head confirming the seller's right to transfer and approval from key family members. This would protect family land rights and prevent fraudulent multiple sales. Legal reforms should also recognize group and family ownership, allowing registration under family or clan names and issuing Certificates of Customary Ownership, like Uganda's model. To reduce barriers, the government should simplify registration procedures and lower fees, especially in peri-urban customary areas. Donor-supported mass documentation campaigns could also increase uptake. Finally, policies must **mandate data sharing** between customary and state land offices, enabling a more unified land administration system and ending parallel record-keeping.

### 7.4.2. Improved Documentation and Record Systems:

Closing the documentation gap is essential. It is recommended that Dome's Customary Land Secretariat (CLS) be resourced and modernized to function as a first-line land record system. This includes digitizing records and adopting standards compatible with the national land information system. The study's model outlines key data to capture: family ownership, oral agreements, allocation notes, and dispute histories. A practical first step is to create a local digital registry (e.g., a GIS or spreadsheet) at the CLS, with routines to sync it with the Lands Commission database. This ensures formal registrations are linked to existing customary records. To address undocumented lands, community-led mapping campaigns could be launched, involving youth or local surveyors to help families map and record basic ownership details. Special attention should be given to documenting the rights of women and vulnerable groups, who are often excluded in informal systems.

Improving local documentation enhances tenure security, transparency, and provides the evidence base for urban planning and service delivery in rapidly growing areas like Dome.

### 7.4.3. Participatory Mapping and Recording Tools (PGIS and STDm):

To enhance implementation, the use of participatory geospatial tools is strongly recommended. Participatory GIS (PGIS) methods, such as community mapping workshops, allow residents to draw and validate parcel boundaries based on local knowledge. The Social Tenure Domain Model (STDm), developed by UN-Habitat's GLTN, is particularly suitable for Dome, as it captures informal land rights without requiring full cadastral surveys. This study recommends piloting an STDm-based system in Dome, where trained community members and CLS staff use the software to document landholders, tenure types, and parcel boundaries using satellite imagery or hand-drawn maps. This approach not only generates spatial data but also empowers residents through inclusive documentation. Successful examples from Uganda and Namibia show that participatory mapping combined with STDm can integrate informal settlements into official land registries. A similar project in Dome, ideally in collaboration with GLTN or local NGOs, could populate the proposed LADM-based model with locally verified data. Over time, this strategy would support gradual formalization by linking socially legitimate records with statutory recognition. Moreover, participatory tools promote transparency and conflict reduction by encouraging community agreement on land boundaries. Scaling up PGIS and STDm methods in Dome is therefore a practical step toward improved land documentation and integration.

## 7.5. Limitation of the study

Despite the methodological rigour and grounded fieldwork, this study encountered several limitations that should be acknowledged. First, the qualitative design, while appropriate for exploring the complexities of tenure arrangements, limits

the generalizability of findings beyond the Dome context. The localized focus means that the model developed may not fully account for tenure variations in other peri-urban or rural settings in Ghana, especially those governed by different customary authorities or legal traditions.

Second, the sample size, though sufficient for thematic saturation, relied heavily on purposive and snowball sampling. This approach, while effective for accessing expert and community knowledge, may have excluded marginalized voices or dissenting views, such as landless individuals or disputants who may not be visible within existing power structures.

Third, validation through scenario testing, although creative and participatory, was constrained by the time and format of responses. Using online tools like Google Forms meant that feedback lacked the depth and interactivity of in-person workshops or iterative co-design sessions. Consequently, some nuances or disagreements may have been missed in interpretation.

Lastly, time and resource constraints restricted the scope of modeling to a conceptual schema. While this model is theoretically robust and grounded in empirical data, its implementation potential remains untested in practice, especially within real land governance workflows. Future research could benefit from piloting this model in collaboration with land agencies to assess technical, legal, and social feasibility.

## 7.6. Future Research Direction

While this study has developed a foundational model and conducted initial validation, further research is essential to support implementation and scaling.

One avenue is action research, where the model is deployed through a prototype or adapted STDN platform to assess its real-world impact. Key questions include: Does integrating customary records into formal systems reduce land disputes or fraudulent sales? Does it enhance tenure security and encourage land registration? A comparative evaluation, e.g., between a pilot and control area, would provide evidence of effectiveness and guide improvements.

Given Dome's unique peri-urban context, comparative studies are also needed to test the model's applicability elsewhere. Testing in other regions (e.g., stool land areas in Ashanti or peri-urban towns in Nigeria) would identify which model components are transferable and which require localization. These efforts could inform a national LADM profile that accommodates Ghana's diverse customary tenure systems.

Technical integration is another key area. Future work could focus on developing plugins for Ghana's LIS to incorporate custom classes like *FamilyParty* or *CustomaryRight*, ensuring compatibility with mapping and surveying systems. The use of emerging technologies such as blockchain and mobile GIS apps could also be explored to enhance record security and real-time land updates from communities.

Finally, longitudinal social research is recommended to examine how improved land documentation affects local behaviors and power dynamics. For instance, does tenure security shift perceptions of land from purely transactional to more stable uses? Do vulnerable groups gain more voice in land governance? These insights would strengthen both the technical and policy relevance of the model and test core assumptions in the continuum of land rights theory.

In conclusion, this thesis has demonstrated that integrating customary and statutory land tenure systems in a peri-urban context is both necessary and feasible. By restating the problem in local terms and co-designing a solution with stakeholders, the study contributes a concrete model and set of insights that can guide reforms in Dome and beyond. Implementing these findings through policy action and further research will be crucial to ultimately achieve more secure, equitable, and well-governed land tenure systems in Ghana's peri-urban areas. The challenges of land governance in places like Dome are significant, but this research offers hopeful evidence that innovative, inclusive approaches – grounded in both community reality and sound data models, can bridge the gaps and pave the way for better land administration in the future.

*During the preparation of this essay the author used ChatGPT in order to check grammatical errors, coherence and logical flow. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.*

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## LIST OF APPENDICES

### Appendix A: The Research Matrix Table.

Table 4 The research matrix table

<i>Objective</i>	<i>Research Question</i>	<i>Data Collection Methods</i>	<i>Data Source</i>	<i>Expected Outputs</i>
1. To identify and analyze the socio-economic and governance factors influencing land tenure security in Dome.	What are the key socio-economic and governance factors affecting land tenure security in Dome?	- Key informant interviews - Focus group discussions - Document review	- Landowners, tenants, chiefs, CLS officers - Land Act, 2020 - Local bylaws	- Thematic analysis of factors - Context-specific understanding of tenure insecurity drivers
2. To assess the challenges and limitations of applying LADM to Dome's unique tenure characteristics.	What are the contextual limitations of using LADM to represent land tenure in Dome?	- Literature review - Expert interviews with land administration professionals	- LADM documentation - Staff from Lands Commission, CLS, academia	- Summary of gaps between LADM and local practice - Opportunities for extending or adapting LADM
3. To propose a conceptual model based on LADM that captures Dome's tenure elements and relationships.	What tenure types and relationships should be captured in a localized model for Dome?	- Fieldwork analysis - Modelling using UML - Interviews with stakeholders for input on model structure	- Interview transcripts - Observations - LADM standard	LADM-based UML model with customized elements for Dome - Representation of tenure relationships and roles
4. To validate the model's alignment with practice and policy through stakeholder feedback.	How well does the proposed model reflect real-world tenure practices and align with legal/policy frameworks?	- Scenario testing through Google Forms - Validation by experts, community members, and institutional stakeholders	- Validation responses - Ghana Land Act 2020 - Feedback from Lands Commission, CLS, legal experts	- Quantitative and qualitative validation results - Charts of scenario evaluation - Assessment of practical feasibility and relevance

### Appendix B: The Historical Context of Land Ownership and Governance in Dome (Nii Sempe Family)

#### Origins of Land Ownership

The land in Dome, as with much of Accra, has deep historical roots tied to indigenous families and traditional authorities. Historically, land in Ghana particularly in Accra belongs to families rather than the state. The state does not inherently own land; instead, it acquires land for specific public purposes under an Executive Instrument. However, if the land is no longer needed for its intended use, it should revert to the original family owners rather than be sold for private interests.

The Nii Sempe Family Lands extend over approximately 25,000 acres, covering a significant portion of Accra. These lands were originally under the authority of the Nii Sempe family, with boundaries stretching from Ablekuma through Dome, Taifa, Pokuase, and Amomoley. Other major land-owning families in Accra include the Gbese, Anomokor, Otorobohu, and others, each with distinct boundaries.

Over time, various portions of these lands were acquired by the government for public projects. For example, in 1973, a large section was allocated for the Ghana Atomic Energy Commission under Executive Instrument 3 (July 1973). Other allocations included land for the pharmaceutical industry (1977), the police barracks at Mile 7 (1973), and the police training fire range (1975).

However, these state-acquired lands were meant for public purposes only. If the government ceased using them, they were supposed to be returned to the Nii Sempe family. Instead, portions of these lands have been sold to private individuals and developers, violating the terms of the acquisition. This has led to numerous conflicts, including land grabbing, forced evictions, and overlapping claims.

### Conflicts and Land Mismanagement

The mismanagement of land in Dome has historical precedents. Unlike older Ga settlements like Ablekuma (14th century), Dome developed much later (17th–18th century). When urbanization began to expand into Dome, members of the Nii Sempe family were absent or disorganized, allowing other Ga groups to claim authority over land sales. As a result, various groups some legitimate and others fraudulent began selling land without proper documentation, leaving many buyers tenure insecure.

Furthermore, within the Nii Sempe family itself, land sales have sometimes been conducted by unauthorized members. This has led to multiple sales of the same parcel, disputes over rightful ownership, and difficulties in obtaining proper land documentation, such as site plans and indentures.

For instance, in 2021, the government conducted a new land demarcation in the Atomic Energy area, leading to a revised blue layout that conflicted with the original 1973 yellow layout. The re-demarcation resulted in some areas falling outside the new boundaries, meaning they should have reverted to the Nii Sempe family. However, government officials and private companies have attempted to retain or resell these lands, exacerbating disputes.

A key example of this violation is the agreement between the Ghana Atomic Energy Commission and Unique Development Company, a private real estate firm. Documents reveal that portions of Atomic Energy's land were leased to private developers, contradicting the public-use requirement of the Executive Instrument. Legal rulings as recent as 2022 reaffirm that such land must revert to the original family.

### Rise of the Customary Land Secretariat

Recognizing these challenges, the Nii Sempe family took steps to formalize land management by establishing a Customary Land Secretariat (CLS). Historically, there was no structured office to document and process land transactions. The new land reforms now require such a secretariat, which the Nii Sempe family has set up at Tesano to ensure all transactions are properly recorded and managed.

Despite these efforts, land sales by unauthorized individuals continue, and cases of land disputes remain high. The presence of land guards, fraudulent surveyors, and corrupt officials has only worsened the situation. One notable case involves a senior surveyor named Bekye, who sold lands without issuing indentures, leaving buyers vulnerable to future claims.

### The Role of the Ga State and Other Ethnic Influences

Land conflicts in Dome are further complicated by inter-ethnic influences and historical migration patterns. For example, while the Gurusi people settled in Dome for farming purposes, they do not hold original ownership rights those belong to the Nkran people. Over time, the Nkran and Gurusi groups collaborated in selling lands, leading to disputes over legitimacy and rightful ownership.

In Akyem, a similar case occurred where a king's lineage was questioned, leading to prolonged litigation over rightful ownership. This mirrors Dome's issue, where various factions claim to be the original landowners, but only the Misinopi clan of the Nii Sempe family has legitimate authority. The Ga-Mantse (King of the Ga State) has been actively involved in reviewing land claims to ensure rightful ownership is recognized.

### Challenges with Land Registration and Title Ownership

The introduction of formal land registration and title ownership has added another layer of complexity. With the new title system, individuals and families are expected to register their lands through the Lands Commission to obtain legally recognized documents. However, several challenges persist:

1. Multiple Sales & Overlapping Claims: Unauthorized family members and fraudulent sellers continue to sell the same parcels multiple times, creating tenure insecurity.
2. Expensive Registration Process: Many residents cannot afford the high costs of land registration, making formal documentation inaccessible.
3. Lack of Awareness & Mistrust: Some landowners distrust the government's land administration system, fearing that registration will lead to the loss of their land.
4. Government Encroachment & Corruption: Portions of family land continue to be acquired and misused by government institutions for private gains, rather than public benefit.

A critical example is the Unity House case, where the buyer had to repurchase the same land at an inflated price due to an initial fraudulent sale. Similarly, lands under the Railway Authority have been resold by Ga family members in collusion with corrupt government officials, leaving many buyers without legal tenure security.

### The Future of Land Governance in Dome

The most important step moving forward is ensuring proper land documentation through root-of-title searches. Unlike basic land searches, a root-of-title search traces the full history of ownership to verify legitimacy before purchasing land.

Additionally, strengthening the Customary Land Secretariat and enforcing laws against fraudulent land sales can help secure tenure rights. The ultimate goal should be a hybrid governance model, where customary authorities work alongside statutory institutions to maintain fair and transparent land allocation.

The land history of Dome and surrounding areas is complex and deeply rooted in indigenous governance, state interventions, and socio-economic pressures. Without proactive solutions, including digital land records, legal reforms, and community education, the risk of tenure insecurity, forced evictions, and land conflicts will continue to rise.

## Appendix C: Questionnaire for tenants/landlords

### Demographic Information

- a. What is your age?
- b. What is your gender?
- c. How many people live in your household?
- d. What is your occupation?

### Parcel Acquisition

#### History of Ownership:

1. How did you originally acquire this land? (Options: inheritance, gift, purchase, allocation by community leader, lease, squatting, other.)
2. Before the new title ownership system, how was your land tenure recognized? (Verbal agreements, family history, community acknowledgment, other.)
3. Now that the customary land has received title ownership, do you intend to register under the new system? (Yes/No/Not Sure)
4. If no, what prevents you from registering? (Options: cost, bureaucracy, distrust, lack of information, risk of losing land, other.)



5. If you register, what benefits do you expect? (Options: security, legal proof, access to loans, ability to sell, other.)
6. Have you been informed about how to register your land under the new title system? (Yes/No/Somewhat)
7. Who provided the information? (Options: chiefs, land administration office, government, family, community meetings, other.)

#### Rights Held Over the Parcel

1. Before the new title system, what rights did you have over this land? (Ownership, lease, use rights, access rights, inheritance, ability to sell, etc.)
2. Now that the customary land has received title ownership, do you believe your rights have changed? (Yes/No/Not Sure)
3. Are there any new restrictions under the title system that were not present before? (E.g., government taxes, zoning laws, changes in inheritance rules, stricter sales regulations.)
4. Who recognizes your land rights under the new title system? (Community, government, both?)
5. Do you think registering under the new title system will help protect your rights? (Yes/No/Not Sure/Explain why.)

#### Recognition of Rights

1. Do you have any formal documentation to prove your rights over this land (e.g., title deed, lease agreement)?
  - i. If not, how do you prove ownership or use rights (e.g., community recognition, oral agreements)?
2. Have your rights ever been disputed? If yes, by whom and how was the dispute resolved?

#### Restrictions on Rights

3. Are there any restrictions on how you can use the land (e.g., zoning laws, community rules)?
4. Does anyone else hold overlapping rights to this land (e.g., shared ownership, community rights)?
  - i. How are these overlapping rights managed or negotiated?

#### Land registration and documentation

1. Have you started the registration process for your land under the new system? (Yes/No/Partially Completed)
2. What documents are required for registration? (Deed, ID, inheritance records, other.)
3. Have you encountered any difficulties in the registration process? (Yes/No/Explain.)
4. What costs are involved in registering your land under the new system? (Registration fees, survey costs, legal fees, community payments, other.)
5. Do you think the registration process is fair and accessible? (Yes/No/Not Sure/Explain.)
6. Would you prefer that registration happens through customary leaders or directly through the government? (Customary leaders/Government/Not Sure.)
7. If a digital land registration system was introduced, would you trust it? (Yes/No/Explain.)
8. Have there been cases where people were denied registration? (Yes/No/Explain.)
9. Do you think the new title system will reduce land disputes? (Yes/No/Explain.)

#### Land security and dispute resolution

1. Since the introduction of the new title system, have there been new disputes over land? (Yes/No/Explain.)
2. If yes, what is the main cause of disputes? (Options: boundary disagreements, inheritance conflicts, double sales, ownership claims.)
3. Who is responsible for resolving land disputes under the new system? (Chiefs, elders, government officers, courts, other.)
4. Have people lost land due to the new title registration system? (Yes/No/Explain.)

5. If someone does not register their land, what happens? (Options: remains informal, risk of land loss, forced to register later, other.)
6. Has the government provided assistance for resolving disputes under the new system? (Yes/No/Not Sure.)

#### Land governance and documentation

- a.
- b. What role do customary leaders play in the new land title system? (Options: approving registrations, collecting fees, verifying ownership, other.)
- c. How does your community track land ownership under the new system? (Options: oral history, community records, digital records, government land registry.)
- d. Has the new title system changed the power or role of customary leaders? (Yes/No/Explain.)
- e. Do chiefs still have authority over land sales and transfers under the new system? (Yes/No/Partially.)
- f. Would you prefer the customary system to continue managing land, or should the government take over? (Options: Customary/Government/Joint Management.)

#### Transactions and Changes Over Time

5. Has the ownership or use of this land changed hands in the past? If yes, how did this happen? (Options: inheritance, sale, gift, lease, allocation, dispute resolution, other.)
6. Was any form of documentation created during these transfers? If yes, what type?
7. If purchased, was a receipt or contract issued? (Yes/No) If No:
  - i. How was the purchase agreement made (e.g., verbal agreement, witness statement)?
8. Do you know who owned this parcel before you? (Yes/No) If Yes:
  - i. How was it transferred to you (e.g., sale, inheritance, allocation)?
9. Have there been any changes in the size, use, or ownership of this parcel? (Yes/No) If Yes:
  - i. What kind of changes occurred?
  - ii. What caused these changes (e.g., subdivision, sale, development)?
10. Have you made any improvements to the land (e.g., buildings, farming activities, fences)? If yes, who permitted you?
11. Do these improvements affect your rights to the land in any way (e.g., increased security or obligations)?

#### Land Use:

12. Do you currently own, rent, or manage the property you live or work on? (Please select one.)
  - Own
  - Rent
  - Manage
  - Other: (Please specify.)
13. What is the primary use of this parcel? (e.g., residential, agricultural, commercial, mixed-use.)
  - i. Are there secondary uses of this parcel? (Yes/No)
    - If Yes:
      - ii. What are the other uses (e.g., rental property, community space, storage)?
      - iii. Are there parts of this parcel that are unused or vacant? (Yes/No)

If Yes:

- iv. Why are these areas unused? (e.g., lack of resources, restrictions, disputes)."
- 14. What informal land use activities take place on your property?  
(Examples: stalls, rentals, informal sales, agriculture, workshops, etc.)
- 15. How do you use your land for private purposes?  
(Examples: residential use, gardening, leisure, storage, etc.)
- 16. What type of agreement do you have with your landlord, if you have?  
(Formal contract/Informal agreement/Verbal understanding/No agreement)
- 17. Can you engage in any income-generating activities on the property? (Yes/No),

If Yes:

- i. What types of activities do you engage in? (e.g., stalls, sales, workshops)
- ii. Do you share any income with the landlord if you have? (Yes/No)
- 18. What is your estimated monthly or annual income from these activities?  
(Approximate ranges are acceptable.)
- 19. Does your landlord, if you have, allow public access or pathways on the property? (Yes/No/Not Sure)

Socio-Economic Impact:

- 20. What proportion of your household income depends on land-based activities (Options: None/Less than 25%/25%–50%/More than 50%)?
- 21. In what ways have land-based activities contributed to your livelihood?  
(Examples: financial stability, food security, business growth, etc.)
- 22. How has access to land affected your ability to improve your standard of living (e.g., education, healthcare)?

Parcel Representation Practices:

Documentation and Records

Ownership Proof:

- 23. "Do you have any formal documents that prove your ownership or rights to this parcel? (Yes/No)"

If Yes:

- i. What type of document do you have? (e.g., a title deed, lease agreement, allocation letter, sales agreement, customary document)
- ii. Who issued this document (e.g., government agency, chief, family head)?
- iii. When was this document issued?

Informal Agreements:

- 24. If you don't have a formal document, how do you prove ownership or use rights? (Examples: verbal agreements, community recognition, witness statements, customary ceremonies.)

Registration Status:

- 25. Is this parcel formally registered with a government or local authority? (Yes/No)

If No:

- i. What has prevented you from registering it? (e.g., cost, lack of knowledge, unwillingness, disputes)
- ii. Would you consider registering it if support was provided? (Yes/No)

Parcel Boundaries

#### Boundary Identification:

26. What methods are used in your community to represent land parcels? (Examples: maps, sketches, verbal agreements, landmarks.)
27. Who is responsible for creating or maintaining these representations (e.g., chiefs, surveyors, government, family heads)?
28. How are the boundaries of your parcel in particular defined? (Examples: fences, natural landmarks like trees or rivers, community-agreed markers, none.)
29. Are these representations shared with others in the community or kept private?
30. Who verifies or agrees to these boundaries (e.g., neighbours, family members, chiefs)?

#### Boundary Disputes:

31. Have there been disputes over the boundaries of this parcel? (Yes/No)

##### If Yes:

- i. Who were the disputes with (e.g., neighbours, family, government, developers)?
- ii. Was the conflict fully resolved?
- iii. How were these disputes resolved?

32. Do the current parcel representations provide you with confidence in your land rights? (Yes/No)

##### If No:

- i. What aspects of the representation are insufficient (e.g., lack of formal recognition, unclear boundaries)?
- ii. What risks do you associate with the current representation (e.g., disputes, lack of documentation, evictions)?
33. Would you prefer a different form of parcel representation? If yes, what would you suggest (e.g., formal maps, digital records, community-verified documents)?
34. Have you ever formally documented your description of the parcel? If yes, in what form (e.g., written agreements, community records)?

#### Shared Boundaries:

35. Do you share any boundaries or access with neighbours? (Yes/No)

##### If Yes:

- i. What kind of shared access exists? (e.g., pathways, roads, water sources.)
- ii. How is shared access managed (e.g., informal agreement, customary rules)?

#### Physical and Spatial Characteristics

##### Size of the Parcel:

36. How do you determine the size of your land
37. What is the approximate size of your parcel? (e.g., in acres, square meters, plots)
38. How was this size determined? (e.g., formal survey, estimation, community agreement.)

##### Shape of the Parcel:

39. What is the shape of your parcel? (e.g., rectangular, irregular, undefined.)

##### Mapping or Measurement:

40. Has your parcel ever been mapped or surveyed? (Yes/No)

##### If Yes:

- i. Who conducted the survey (e.g., government agency, private surveyor, community leader)?
- ii. Was the map or survey officially documented? (Yes/No)

#### Land Security:

41. How secure do you feel in your ability to continue using this land?  
(Scale: 1 to 5, with an option for open-ended explanation.)

42. Have you encountered any disputes over your land rights? (Yes/No)

If Yes:

- i. Can you describe the nature of the dispute?
- ii. How was it resolved, if at all?
- iii. Who was involved in resolving the dispute?

43. Have you faced eviction or threats of displacement? (Yes/No)

If Yes:

- i. Who posed the threat? (e.g., government, neighbours, developers.)
- ii. What were the circumstances surrounding the eviction or threats?
- iii. Were you provided with compensation or relocation support? (Yes/No)
- iv. What actions did you take to address the situation?

Governance Structures:

63. How do local chiefs or customary leaders influence your land rights?

64. What role does the local government play in resolving land issues you face?

65. Have conflicts between statutory and customary governance systems affected your land use? If yes, how?

Affordability of Land Registration:

66. Have you attempted to formalize your land? What prevented you from completing the process?

67. Do the economic costs of registration and titling make it difficult for you to formalize your land rights and why?

68. If you had access to a low-cost land registration process, would you be willing to formalize your land? Why or why not?

69. Would you find it helpful if land documentation processes included more flexible options (e.g., community validation)?

#### **Appendix D: Interview with Nii Sempe Customary Land Secretariat (CLS) Officer on LADM & Land Governance**

1. How does the Customary Land Secretariat (CLS) currently document land ownership and transactions?
2. What challenges does CLS face in integrating its land records with the government's land registration system?
3. Would CLS be willing to collaborate with the Lands Commission under LADM? If so, under what conditions?
4. How can LADM be adapted to protect family and communal land under the customary system?
5. What would make customary landowners more likely to register their land under LADM?

6. What role does the CLS play in resolving land disputes, and how can this be integrated into LADM?
7. Do you see any risks in fully integrating LADM into the customary land system?
8. So, what do you suggest, then?

#### **Appendix E: Questionnaire for Customary Authorities (chief) Perspectives on Land Governance and Title Registration**

1. What traditional land allocation rules were most effective before the introduction of the title system, and do you think they should be maintained?
2. Before the new title system, how was ownership managed within the community?
3. Now that customary land has received title ownership, how has your role changed?
4. How has the new title system influenced the power and authority of chiefs and elders in land governance?
5. Do chiefs, elders, or your family still have the authority to allocate land under the title system?
6. Have government interventions in land registration created tensions between the community and state authorities? If so, in what ways?
7. How do you ensure that residents understand and trust the new title system?
8. Are chiefs and elders still involved in land disputes, or are cases now referred to government institutions?
9. What new challenges have you faced since the title system was introduced?
10. How has the introduction of the new title system affected land tenure security for different groups (e.g., families, individuals, women, migrants)?
11. Are community members more confident in their land ownership now that formal titles are being issued? Why or why not?
12. Have you observed a reduction in land-related disputes since the introduction of title registration? If not, why do disputes persist?
13. Have there been cases where individuals lost land due to a lack of proper documentation under the new system? How were these cases handled?
14. Do people who previously acquired land informally feel encouraged or discouraged to register under the title system? What are their main concerns?
15. What is your role in helping residents register their land under the new title system?

16. What challenges have you faced in helping residents transition from customary tenure to registered ownership?
17. Have some residents refused to register under the new system?
18. How is land inheritance handled under the new title system?
19. Have land prices increased since the introduction of formal land registration? If so, how is this affecting residents?
20. Are land transactions (sales, leases, inheritance) now easier or more difficult due to the title system?
21. Has land registration encouraged real estate development or investment in Dome? What changes have you observed?
22. What are the financial implications of the registration process for low-income landowners?
23. Are there mechanisms to support vulnerable groups (e.g., widows, migrants, low-income earners) in securing land titles?
24. What are the most common reasons for disputes related to land allocation?
25. In Dome, when land disputes arise among family members or between different land buyers, what alternative dispute resolution (ADR) mechanisms do you use?
26. Have ADR methods been effective in preventing long-term disputes?
27. What steps do you take in resolving land disputes?
28. Do you maintain records of resolved disputes?
29. What happens if a dispute resolution decision is not accepted by one of the parties?
30. What are the most significant barriers preventing full adoption of the title system in Dome?
31. How accessible is the land registration process for ordinary community members? What improvements can be made?
32. Have cases of fraudulent land sales or multiple claims on the same land reduced since the introduction of the title system?
33. How are community members reacting to the costs associated with title registration? Is there financial support available for those who cannot afford it?
34. Are there any alternative dispute resolution mechanisms in place for land conflicts, aside from going to court?
35. Have you worked with government institutions on land administration?

36. Have there been conflicts between customary authorities and government institutions?
37. Have you encountered conflicts between traditional landlords and statutory landlords?
38. How can the Land Administration Domain Model (LADM) be integrated into Ghana's land governance system without disrupting customary land tenure practices?
39. Are parcels of land in the community typically owned by families, individuals, or the community?
40. What rules govern land transfers within your territory?
41. What cultural practices help ensure fairness in land allocation?
42. Would your community be open to using digital tools for documenting land parcels?
43. What lessons can be learned from Dome's experience with land title registration that could benefit other communities facing similar challenges?
44. How do you see the future of customary land governance under the title system?
45. Would you support future reforms that give chiefs more legal authority in land registration? Why or why not?
46. What steps should be taken to ensure that the land administration system continues to work effectively for future generations?
47. How do you think LADM can be adjusted to fit the realities of customary land tenure in Dome?
48. How can the government and traditional authorities collaborate better to manage land more efficiently in Dome?
49. Do women, migrants, or marginalized groups have the same access to land?
50. What happens to people who acquire land informally without proper verification?
51. What specific responsibilities do traditional leaders have in maintaining land records?
52. Do you think chiefs and government agencies could work together better to manage land in Dome?
53. What aspects of customary land practices should remain unchanged?
54. Would you be willing to allow the government to oversee customary land sales through LADM?
55. What improvements are needed to secure tenure for future generations?

**Appendix F: Questionnaire for Customary Authorities (Family Head) Perspectives on Land Governance and Title Registration**



1. What traditional land allocation rules were most effective before the introduction of the title system, and do you think they should be maintained?
2. Before the new title system, how was ownership managed within the community?
3. How has the new title system influenced the power and authority of chiefs and elders in land governance?
4. Do chiefs, elders, or your family still have the authority to allocate land under the title system?
5. Have government interventions in land registration created tensions between the community and state authorities? If so, in what ways?
6. How has the introduction of the new title system affected land tenure security for different groups (e.g., families, individuals, women, migrants)?
7. Are community members more confident in their land ownership now that formal titles are being issued? Why or why not?
8. Have you observed a reduction in land-related disputes since the introduction of title registration? If not, why do disputes persist?
9. Have there been cases where individuals lost land due to lack of proper documentation under the new system? How were these cases handled?
10. Do people who previously acquired land informally feel encouraged or discouraged to register under the title system? What are their main concerns?
11. Have land prices increased since the introduction of formal land registration? If so, how is this affecting residents?
12. Are land transactions (sales, leases, inheritance) now easier or more difficult due to the title system?
13. Has land registration encouraged real estate development or investment in Dome? What changes have you observed?
14. What are the financial implications of the registration process for low-income landowners?
15. Are there mechanisms to support vulnerable groups (e.g., widows, migrants, low-income earners) in securing land titles?
16. What are the most significant barriers preventing full adoption of the title system in Dome?
17. How accessible is the land registration process for ordinary community members? What improvements can be made?
18. Have cases of fraudulent land sales or multiple claims on the same land reduced since the introduction of the title system?

19. How are community members reacting to the costs associated with title registration? Is there financial support available for those who cannot afford it?
20. Are there any alternative dispute resolution mechanisms in place for land conflicts, aside from going to court?
21. How were family lands allocated before the title system?
22. Has the title system changed the role of family heads in land governance?
23. Do family heads still have authority over land transactions?
24. Have family disputes over land increased or decreased under the title system?
25. How do family heads ensure fair land inheritance and prevent disputes?
26. What are the biggest challenges in registering family lands under the title system?
27. Are families more secure in their land ownership with the title system?
28. How does land inheritance work under the new system?
29. What changes would improve the system for families?
30. How can family heads work better with chiefs and government agencies in land governance?

#### **Appendix G: Questionnaire for LI specialist**

1. Can the Land Administration Domain Model (LADM) be modified to reflect both customary and statutory ownership in a place like Dome?
2. Has LADM been applied in any specific locations in Africa, particularly in Ghana? What has been the experience?
3. If LADM were implemented in Dome, how could it help track, store, and validate customary land records?
4. What governance structures need to be put in place for customary landowners to engage with the LADM framework?
5. What would be required to implement LADM successfully in Ghana? Do we already have the necessary technology, or would we need additional infrastructure?

#### **Appendix H: Questionnaire for Senio Geo Informatics Head.**

1. What mechanisms have been put in place to register customary lands under the new title system?
2. What requirements do residents need to meet for the registration of their land?

3. What are the most common challenges preventing people from registering their lands?
4. Has the government introduced any low-cost or subsidized registration programs?
5. How does the land registry ensure that previous customary landholders are recognized in the new system?
6. How can digital technology be used to harmonize statutory and customary land records under LADM?
7. What are the biggest technical barriers preventing the full implementation of LADM in Dome?
8. What solutions can help overcome these technical barriers?
9. Have there been cases where land registration was denied or challenged?
10. Has there been an increase in land disputes since the introduction of the new title system?
11. What role do customary authorities play in the new title system?
12. Are traditional land records integrated into the government system?
13. What is the biggest barrier to integrating these two systems?
14. What steps have been taken to harmonize customary land governance with formal land governance?
15. Does the government recognize customary dispute resolution, or must all conflicts go to court?
16. Has the ELIS (Electronic Land Information System) improved efficiency?
17. Can ELIS integrate both customary and statutory systems?
18. Why is it not fully implemented yet?
19. Do you think chiefs would buy into this system?
20. Are there mobile registration units for residents?
21. Has there been a case where the state and an individual fought over land?
22. Do courts respect customary land agreements when ruling on disputes?
23. What improvements can the government make to land registration?

#### **Appendix I: Questionnaire for Senior Lands officer**

1. What systems or processes are used to register land in Dome?
2. Which institutions or offices are responsible for overseeing land registration in Dome?

3. What documentation is required from residents to complete the registration process?
4. What common obstacles do residents report when attempting to register their land?
5. Are there any additional challenges not listed?
6. Are there specific groups that face more difficulties in registering land?
7. In your opinion, does the current land registration system adequately protect residents from land disputes and ensure tenure security?
8. Have residents expressed concerns about the effectiveness of the land registration system?
9. What improvements would you recommend making the system more effective?
10. What land-related policies or regulations are in place to address land tenure security in Dome or in Ghana?
11. How are these policies communicated to residents, and are they widely understood?
12. Are there specific policies aimed at protecting vulnerable groups, such as women, tenants, or informal settlers?
13. Do you think the current policies adequately address the causes of tenure insecurity?
14. Are there Ghanaian policies that fail to recognize customary tenure?
15. What reforms or recommendations would make land policies more effective in securing tenure for residents?
16. Are there interventions, such as subsidized registration fees, to support land registration?
17. How can customary authorities help improve policy implementation?
18. Are there initiatives aimed at integrating customary and statutory land systems in Dome?
19. What are the main challenges in integrating customary and statutory systems?
20. Do conflicting perceptions of ownership between statutory and customary systems contribute to disputes?
21. How can the Land Administration Domain Model (LADM) be integrated into Ghana's land governance system without disrupting customary land tenure practices?
22. How can LADM ensure that family and communal land rights are formally recognized?
23. What strategies could help overcome these barriers?
24. Can you give an example of a place where the customary and statutory systems have been successfully integrated?

25. Could the Land Administration Domain Model (LADM) simplify land registration?
26. What mechanisms exist to resolve disputes between statutory and customary systems?
27. Aside from ADR, what other measures can help resolve conflicts?
28. What steps should be taken to improve land governance?

#### **Appendix J: Questionnaire for Senior Lawyer.**

1. What specific land-related policies or regulations are in place to address land tenure security in a place like Dome?
2. Is the Land Act 2020 accessible to the public?
3. Can it be accessed online in the form of a PDF?
4. What do you mean by Regulation for the Land Act?
5. So how are these policies communicated to residents and are they widely understood? Do you engage all stakeholders or concerned parties before drafting these laws?
6. Are there specific laws that seek to protect vulnerable groups/individuals such as women, informal settlers, or tenants?
7. Do you think this current policy adequately addresses the causes of tenure insecurity?
8. Are there specific gaps in policy implementation?
9. Is having an indenture between you and another party alone not enough to prove ownership of land in Ghana?
10. Has there ever been a case where Party A failed to submit their land documents to the Lands Commission before Party B, resulting in Party B being recognized as the owner?
11. What examples can you provide of a successful policy application that improved tenure security?
12. Do you know of any specific policies that fail to recognize customary land tenure?
13. Would you provide more recommendations or reforms to make these policies more effective in securing tenure for residents?
14. How can digital technology be used to harmonize statutory and customary land records under LADM?
15. What legal reforms are needed to allow LADM to function effectively in Ghana?

16. What role should local government authorities (municipal assemblies) play in ensuring that LADM is successfully adopted?
17. How can LADM prevent fraudulent land sales and double allocations in customary areas?

## Appendix K. Validation Questions and Answers Link.

Scenario 1

<https://docs.google.com/forms/d/1ri7WuEyFdTWUjynKAcxS3Ov2o0QT4E2gQY38ikzmtIU/edit>

scenario 2

<https://docs.google.com/forms/d/1l20dHyp2XR0gIMEc-dEiiuj1Kd0amwYViR6txcHaPbA/edit>

scenario 3

<https://docs.google.com/forms/d/1MDLpo9zdNtgps6IA3LjKmSuQE7Wu2icO6LTy3yw6IRo/edit>

scenario 4

<https://docs.google.com/forms/d/1k20FHYNVZ9dOqhwgnRL4PUvghPyy69V29moH-dZ6Wg8/edit>

scenario 5

<https://docs.google.com/forms/d/1-jEHUtvIA5sVttZZYkb9FcOpQoyRfMXbRpk2T8YClOk/edit>

scenario 6

[https://docs.google.com/forms/d/15HjzIY-2ImpC5kpfk1\\_Pm7DzwsynhvxxkEnt6OVIGQkk/edit](https://docs.google.com/forms/d/15HjzIY-2ImpC5kpfk1_Pm7DzwsynhvxxkEnt6OVIGQkk/edit)

scenario 7

[https://docs.google.com/forms/d/1b7rwwqsh04\\_3gTxdoS0cdLdrHqBWqdO3jB9b0ELopTM/edit](https://docs.google.com/forms/d/1b7rwwqsh04_3gTxdoS0cdLdrHqBWqdO3jB9b0ELopTM/edit)

## Appendix L: Explaining the Social Extensions

L1. Family Land and Consent-Based Decision-Making in Sales  
Land in Dome is commonly held as family property, and decisions over such land require broad intra-family consensus. Multiple interviewees stressed that single family member should not unilaterally sell family land without the agreement of the others. One resident explained that “there must be a family agreement before selling it. Without permission from the family, it cannot be sold”. In practice, this means all principal members (often the extended family or clan heads) are stakeholders in any transaction. A representative of the Customary Land Secretariat (CLS) likewise advocated a multi-party consent mechanism for family land, whereby “all principal family members must approve a sale before it is recorded... to prevent cases where a single family member secretly sells land without informing the rest.”. Such consent-based decision-making is both a cultural norm and a safeguard; it evolved to protect family inheritance and prevent the notorious multiple sales and fraud that occur if one person attempts to alienate communal land. The implication is that family co-ownership is an essential relationship: individual rights are nested within collective family rights. The fate of a land parcel hinges on internal family dynamics. For instance, a buyer must not only negotiate with the ostensible owner but also obtain the blessing of the wider family. This interdependence can slow down land transactions, but it also provides a check against unsanctioned sales. When ignored, the lack of consent leads to disputes; as one official noted, many conflicts and “multiple sales of the same land” stem from situations where “family heads make land decisions without any legal oversight”, underscoring why clear rules ensuring family consent are needed (LIS Specialist). In summary, family land tenure in Dome is governed by collective decision-making: sales or transfers are legitimate only if the extended family (through its elders or secretariat) approves, making “family consensus” a critical tenure relationship to document.

L2. Informal Landholders Lacking Formal or Customary Recognition

Another key feature of Dome's tenure landscape is the presence of informal landholders – people occupying or claiming land without formal title and often without clear customary recognition either. These may include settlers on unused plots, buyers who obtained land through unofficial arrangements, or individuals holding only a rudimentary allocation note that the state does not recognize. Such landholders exist in a tenure limbo: they have *de facto* possession but no *de jure* rights. A Lands Commission officer observed that many residents rely on customary allocation notes or verbal agreements, and “since these are not legally recognized for title registration, many landowners struggle to complete the process, making it difficult for them to obtain formal land tenure security”. In other words, those with only informal or unregistered documents are vulnerable, they cannot easily defend their claims in court or register their interest. Customary authorities confirm this vulnerability: people who acquire land informally “without proper verification” are “vulnerable to losing their land”, and they are encouraged to come forward to have their claims recognized to avoid future disputes. Some informal holders lack even customary acknowledgment; for example, a focus group revealed cases where the person controlling a plot was merely a caretaker on behalf of an absentee owner. One tenant recounted that “my landlord is a caretaker, not the actual owner. So, I always fear that one day, the real owner might come and ask all of us to leave” FGD 2 Tenant. This scenario illustrates an informal tenancy arrangement where the “landlord” has no true ownership rights, neither a title nor the family's blessing, and thus cannot guarantee the tenant's occupancy. Informal landholders often occupy land at the sufferance of others: they may pay some token or rent to a local family head or simply squat until challenged. Their rights are the most precarious in Dome's tenure hierarchy. Documenting these situations is essential because unrecognized landholders frequently become sources of conflict (for instance, if the rightful owner returns or if the informal occupant tries to sell the land illicitly). In summary, the informal, unrecognized landholder is a tenure role characterized by the absence of legal or customary validation, highlighting a gap between on-the-ground reality and official records.

### L3. Gender Dynamics: Women's Exclusion from Land Decision-Making

Gender plays a significant role in Dome's tenure relationships. Traditionally, land decisions and ownership documentation are male dominated, leading to women's exclusion from decision-making in many families. Even when women are members of the landholding family (e.g., wives, daughters, or widows), their ability to influence sales or inheritance allocations is limited by custom. One female landowner recounted that “my rights were questioned simply because I am a woman”, indicating that her claim to family land was initially not taken seriously by male relatives. This reflects a broader pattern where patriarchal norms in Dome mean that men (often the oldest males or the family head) speak for the family in land matters, while women's consent or preferences may be overlooked. The same respondent noted that little is being done in the community to improve women's land rights: “Traditional customs and lack of legal support” remain major obstacles. For example, daughters may not inherit family land if customary rules favour lineage through male lines, or wives may be excluded from decisions to sell land that they farm or reside on. Several interviewees suggested that women often must rely on informal influence or appeals to legal rights when customary practice sidelines them. This exclusion is essential to document because it affects tenure security: a woman's use of land might be secure only until a male relative decides otherwise. Indeed, cases were noted where widows or sisters were displaced or had to fight for their share when land was being registered or sold by male kin (often because their names were not on any customary record). Thus, gender inequality in tenure is an interdependent relationship; women's rights are often mediated by their relationships to men (fathers, brothers, husbands) in the family. While Ghanaian statutory law provides for gender-equal inheritance, in practice, many women in Dome do not benefit from those protections due to low awareness and the strength of custom. For our purposes, recognizing women's exclusion as a distinct tenure dynamic is important: it points to hidden stakeholders (women family members) whose consent is rarely obtained but whose lives are deeply affected by land decisions. Any documentation of land rights that lists only the “family head” or a male owner risk masking the secondary interest that women have and the injustice they may face.

### L4. Tenants with Insecure Rental Rights

Dome, being peri-urban, has a growing population of tenants, people who rent houses or rooms on land owned by others. The relationship between landlords and tenants introduces another layer to the tenure landscape. Tenants typically have use rights (to occupy and use a dwelling) that are time-bound and conditional, and these rights are often insecure, especially in informal renting arrangements. Focus group discussions highlighted that many rental agreements are verbal or only semi-formal, leaving tenants vulnerable. “I do not feel completely secure because I have no formal document. If the landlord decides to evict me suddenly, I wouldn’t have much protection,” one tenant explained (FGD 2 Tenant). Without written contracts or legal registration of the tenancy, renters have little recourse if evicted or if the landlord changes the terms. Even those with written agreements are not fully safe: another tenant with a contract noted that this did not stop a landlord from selling the property out from under the tenants. “People... were asked to leave within weeks because the landlord sold the property” (FGD 2 Tenant). Such cases are not uncommon in Dome, where rising land values tempt landlords to sell or redevelop, often disregarding tenants’ prior arrangements. Tenants also face various restrictions and lack decision-making power over the space they occupy. For instance, some landlords in Dome forbid tenants from sub-letting or from using the premises for business and can impose arbitrary rules (one respondent noted only married couples are allowed, another mentioned sudden rent increases) in focus group discussion 2. Another made also emphasis that, “... if landlord decides to evict me suddenly, I wouldn’t have much protection...”. The tenant-landlord relationship is therefore characterized by an imbalance of power: the landlord (who may be a family landowner, a leaseholder, or even a caretaker, as noted) holds the property rights, while the tenant’s interest is usually unrecorded and entirely dependent on the landlord’s goodwill and the rental terms. This relationship is essential to capture because tenants form a significant portion of the community, and their tenure needs (long-term stability, protection from unfair eviction) are part of the broader tenure security equation. Moreover, tenants can sometimes become pawns in larger disputes; for example, if the landowner’s right is contested or the family decides to reclaim the house, the tenant is directly impacted. In summary, tenancy in Dome is an insecure, secondary form of landholding that overlaps with ownership rights. A single plot of land might have an owner (formal or customary) and a tenant occupying a structure; documenting the full tenure situation requires noting the presence of such non-owner interests.

#### L5. Chiefs and Clan Heads: Hierarchical Authority over Land

Underpinning Dome’s tenure arrangements is the authority of traditional leaders, chiefs, clan heads, and family heads who exercise control over land allocation and governance. Dome falls under a customary land tenure regime where all land was originally vested in stools (chiefdoms) or families. As such, even when individuals claim ownership, there is an often implicit higher-layer claim or oversight by these customary authorities. Interviews confirmed that local chiefs and family heads (clan heads) wield significant influence. A customary leader explained that “land in Dome is typically owned by families. Individual ownership happens when families allocate plots, but all transactions must go through the family secretariat.”. This means that any sale, lease, or transfer of land is expected to be sanctioned by the family’s land-secretariat (a body of elders or the family head) or, in the case of stool land, by the chief and his council. The relationship between an individual landholder and the chief or clan head is hierarchical: the latter provides legitimacy to the former’s claim. One resident who bought land recounted that he purchased it from the chief and received customary documents (site plan, allocation paper, receipts) as proof (Resident 8). In his case, “the community recognizes my ownership” based on those customary documents and the chief’s endorsement, even though “the government has not yet endorsed it”. This highlights how community recognition, rooted in the chief’s or family head’s authority, can be separate from formal recognition. The chief and clan heads also serve as arbiters in disputes and enforcers of tradition: they may mediate boundary disagreements, ensure no family member is skipped in inheritance, or uphold norms like requiring family consent as noted above. However, their authority can also create complications. Because they can allocate land, there have been instances of conflicting allocations; as a lands officer noted, “some chiefs and family heads sell land that has already been allocated”, leading to overlapping claims and “ownership conflicts.”. Such abuses aside, the structural



relationship remains that every piece of land in Dome is under a custodial hierarchy. The chief's allodial title or the family's collective ownership is the root, and individuals hold derivative rights. Even when land gets formally titled, many believe the chief or clan head should still be consulted. One interviewee lamented that a dispute could have been avoided "if the original owners (family) were involved in the decision" when the land was sold by the government. (Resident 4). This indicates that ignoring the customary hierarchy (e.g., a state agency allocating land without local chief/family consent) is perceived as illegitimate and sparks conflict. Therefore, documenting tenure relationships in Dome requires recording not just the individual owner but also the customary authority relationships. who is the family head or chief with jurisdiction over that land? Has that authority been involved or bypassed in transactions? In sum, chiefs and clan heads provide the umbrella of legitimacy and control in Dome's tenure system: they authorize land deals (or should authorize them), maintain community land records, and can even nullify transactions that lack their approval. Their role is the backbone of the tenure landscape.

#### L6. Formal Title Holders and Contested Rights

As Ghana's formal land registration (title system) extends into Dome, a new tenure relationship has emerged: that between formal title holders and the customary claimants who contest those titles. Dome has seen cases where an individual acquires a title certificate or registered deed to a plot (for example, via purchase from government or through the formalization of holdings) only to find that the land is simultaneously claimed by a family or stool who argue the land is theirs. These situations result in overlapping claims, one recognized by statutory law, the other rooted in customary right, and they often lead to protracted disputes. For instance, one resident recounted purchasing land "in good faith" (through formal channels) and investing everything into it, only to discover that the original customary owners still assert rights. "I live in fear... now I don't know if I will lose it all," he confessed, noting the absence of clear assurance from authorities on whose claim prevails. In his case, the land had been previously acquired by the government and then sold to private buyers, but the family expected the land to revert to them; with the new owners holding official papers, the family must fight to reclaim it. This and similar cases illustrate a fundamental tenure relationship, contested ownership between statutory and customary systems. The formal title holder sees the land as private property, while the customary collective sees it as family/stool land wrongfully alienated. The relationships here can be adversarial, e.g., litigation or threats of eviction, but they are essential to document because they show who has a stake in the land. The interviewed titleholder believed a "government-backed resolution" is needed to confirm ownership or compensate the customary family, and he strongly felt that such conflicts arise when "the community [is not] consulted before any sale is finalized". Indeed, lack of prior consent or notification to customary owners is a common thread titles issued without ground verification of customary interests result in two parties each thinking they have the right to the same parcel. From a documentation perspective, this means a single spatial unit in Dome might have multiple overlapping tenure records, a registered owner, and an outstanding customary claim. The tenure relationship is essentially a dispute, sometimes lasting years. It is important to capture not just the existence of the formal title but also any claims against it. For example, in Dome, if a family land was titled by one member without consent, other family members may contest it as an improper singularization of collective property. Such an internal family contest over a title is another variant of this relationship. In summary, formal vs. customary contested rights are now part of Dome's landscape: documenting them requires noting instances of disputed titles, the parties on each side, and the basis of contestation (e.g. "family X claims customary ownership against title holder Y"). This ensures that anyone examining the land record understands the unsettled nature of that right and the interdependence of formal and informal claims.

#### L7. Leaseholders and Derived Secondary Rights

Finally, Dome's tenure fabric includes various forms of leasehold and secondary rights that connect different parties over the same land. In Ghana's land system, it is common for land to be held under long-term leases (e.g., a 50-year or 99-year lease from a stool or a sublease from an initial allottee) rather than outright freehold. In Dome, such leasehold arrangements create a chain of interests: a paramount owner (family or stool) leases the land to an

individual or institution, which may in turn lease or rent it out to others. These leaseholders have rights that are legally defined for a period, but they do not have the absolute ownership; their interest is derived and often time bound. One lands officer's description of the registration process hints at the prevalence of layered leaseholds: Applicants must produce not only their deed but sometimes the "head lease of their grantors" (or other superior documents) as part of the title registration. In other words, if Person A's claim comes via a lease from Person B (who might be the family head or original allottee), the Lands Commission wants to see Person B's original title or lease to validate A's rights. This implies that many residents are effectively sub-lessees or derivative right holders, and their tenure is linked to a higher agreement. An example might be a family that leases a portion of its land to a developer for 50 years; the developer is a leaseholder with exclusive use rights for that term, but the family retains the underlying title and expects reversion of the land after 50 years. In the interim, the developer might rent houses to tenants, adding yet another layer. Leaseholders in Dome thus stand between the customary owners and the end-users. Their relationship to customary owners is often defined by contracts (with obligations like ground rent payments, permitted use, and duration). While leasehold interests tend to be formally documented (contracts or indentures), they can still be contested if, say, the lessor (a family head) was not truly entitled to lease the land or if the lease terms are violated. Additionally, when leases expire, the transition can be fraught if the lessee has developed the land significantly. Interviewees hinted at concerns that at the end of leases, original owners "will lose all our land to private individuals" if conversions to freehold happen (Resident 9), while leaseholders fear losing their investments if they cannot renew. Although no single interview explicitly narrated a leasehold case, the structure was evident: one resident mentioned paying annual fees to the Railways Authority for his land (Resident 6), which suggests his plot might be on land leased or licensed from a state agency (hence not outright his). Such scenarios underscore that leaseholds are a practical reality to record. They exemplify evolving rights. Today's leaseholder might become tomorrow's owner if laws change or, conversely, might revert to the tenant if the lease lapses. Documenting the tenure landscape, therefore, must capture not just permanent ownership but also these intermediate interests: who holds leases, for how long, under what conditions, and with which superior and junior parties linked. Leaseholders form a bridge between the customary realm and formal land markets, making their inclusion in any land information system critical for completeness.

#### L8. Group Party for Family Ownership and Family Consent:

LADM's Party class (which normally represents an individual or organization involved in land rights) can be extended to explicitly represent family groups or clans as legal parties. A Group Party instance (e.g., "The Nii Sempe Family of Dome") would consist of multiple individual parties (family members) and could be the named owner of a BAUnit. This aligns with the idea of a family trust or collective title that many interviewees advocated (Resident 9, the CLS). By treating the family as a single legal entity, the system can register land to the family as a whole (ensuring no single person's name excludes others). Within this structure, consent-based decision-making can be handled through either Party roles or internal rules: for example, all adult members of the Group Party could be recorded with a role (or an attribute) indicating they must sign off on transactions. An attribute "consentStatus" on a pending transaction or RRR could indicate whether the required family members (parties) have provided consent. Alternatively, a custom Restriction object could be placed on the family's land BAUnit stating that "Transfer requires approval of all members of Party X," providing a formal constraint in the data. This way, when a sale is initiated, the system can check that all constituents of the family party have endorsed it (mirroring the customary family meeting and agreement that would occur). Modelling the entire family as a unit ensures that family co-ownership is visible in the records (not hidden behind one person's name) and captures consent requirements. It formalizes the safeguard that no family land sale is valid without multi-party approval (Resident 6, the CLS). This extension addresses the reality of Dome, where family land is the norm, and prevents the scenario of secret sales by one member.

#### L9. Customary vs. Statutory Rights and Overlapping Claims:

To reflect Dome's dual tenure system, the model will allow multiple RRRs on the same BAUnit/Spatial Unit, distinguishing between customary claims and formal rights. In LADM, an LA\_Right class instance could have a type of attribute drawn from a code list (e.g., "Allodial (customary)", "Customary usufruct", "Freehold title", "Leasehold (99-year)", "Occupancy (informal)", etc.). A single parcel (spatial unit) might have, for example, an

allodial right held by a Stool (chief) as one RRR, a customary use right held by a family as another RRR (often these would be superior and subordinate relationships), and a registered leasehold title held by an individual as a third RRR. Standard LADM can model such overlaps by associating multiple RRRs to one BAUnit, but a clearer conceptual separation is useful: it could introduce a specialization or tag for “customary RRR” vs “statutory RRR”. Each claim can also carry a legality attribute (formal, informal, disputed). For contested lands, one RRR (say the formal title) could be marked as “disputed=yes” and linked to a corresponding customary RRR (family claim) via a Conflict relationship. It might create a lightweight class called TenureConflict that links two or more RRRs that conflict, storing metadata like conflict type (e.g., “Customary vs Title”) and status (pending, resolved). Additionally, the model can integrate dispute resolution records: (the CLS) suggested that customary dispute resolutions be recorded in the system. To support this, each TenureConflict could link to an LA\_Source (document) that is a record of a mediation or judgment, or a new class DisputeRecord could encapsulate details of the conflict (parties involved, decisions by chief or court, dates). The goal is to avoid erasing one claim in favor of another; instead, the system acknowledges all claims. For a user of the land system, seeing that a parcel has both a “Right: Title (Holder=John Doe)” and a “Right: Customary Family Ownership (Holder=Nii Sempe Family)” flagged in conflict would immediately signal caution, any transaction will require resolving or managing that overlap. This explicit modeling of overlapping statutory/customary claims makes the interdependence transparent and helps prevent situations where, for example, a title is issued without realizing a family claim exists (the very scenario our interviewees feared (Resident 4). Over time, as conflicts are resolved (e.g., family consent is obtained and the family’s claim is merged into the title, or the title is revoked/compensated), the records can be updated accordingly, but the historical relationship will remain traceable.

#### L10. Hierarchical BAUnits for Stool–Family–Individual Land:

Dome’s tenure hierarchy (stool land -> family segments -> individual plots) can be represented by organizing BAUnits in a hierarchical or linked structure. LADM does not mandate how BAUnits relate, but I can utilize the concept of ‘groups of spatial units’ or simply maintain references between BAUnits. For instance, consider the entire area of Dome under a stool’s allodial title as one BAUnit (A) associated with the Stool Chief party holding an ownership right. Within that, each family’s customary area could be another BAUnit (B1, B2, etc.) for which the family group party holds a customary ownership right; BAUnit B1 (family land) could be associated to BAUnit A (stool land) via a relation “is part of” or via the stool’s right spanning both. Then, individual plots allocated to family members would be spatial subunits of B1, or separate BAUnits (C1, C2, etc.) that are linked to B1. In BAUnit C1, the individual might hold a lease or use-right granted by the family (which in turn is enabled by the family’s broader right under the stool). By capturing these links, one can navigate from an individual parcel up to the family estate and up to the stool land, reflecting nested tenure layers. An alternative approach using standard LADM would be to treat the family’s interest and the individual’s interest as distinct RRRs on the same spatial unit, but that can become confusing if many family members have distinct plots. Instead, modeling family land as a larger administrative unit containing smaller units provides a cleaner separation. It can also incorporate the notion of a “Community Landholding Database” as suggested in interviews with one of the CLS officers: essentially, marking which BAUnits are communal (stool or family) land. This could be done with a simple attribute or classification on BAUnits (e.g., BAUnit.type = “Stool Land”, “Family Land”, “Individual Holding”). The system could then generate lists or maps of all stool lands and family lands, helping prevent illegal or inadvertent sales of such communal property (since any attempt to register an individual title on a BAUnit flagged as “Family Land” would alert officials to check consent, etc.). In practice, this hierarchical modeling ensures that even if a parcel is registered to an individual, the backdrop of customary ownership is not lost, it lives on in the data model through the linked BAUnits and RRRs. It operationalizes the idea that family land can be recorded collectively while still allowing individual interests, as one customary leader put it: “recorded collectively instead of just under one person’s name”. (Customary Head)

#### L11. Tenancy and Leasehold as Recognized RRRs:

To bring tenants and leaseholders into the model, I treat their interests as formalized RRR instances as well. LADM's LA\_Right can cover leaseholds by specifying the share, time period, and party. For example, if a family (Group Party) leases a plot to an individual for 50 years, the individual gets an LA\_Right of type "Leasehold" with a time component (start date, duration) associated with the BAUnit (the plot). The family group would also still have an LA\_Right (perhaps type "Ownership" or "Customary freehold") on that same BAUnit, indicating reversionary interest. This way, leaseholder relationships are explicit: queries can show all leaseholds, their term, and the lessor (the party that granted the lease, which in this case is the family). For shorter-term tenants (renters without formal leases), I might use LADM's LA\_Right or LA\_Use (a subclass for use rights) to record a non-owning interest. A "Tenancy" right could be a custom subtype of use-right, linked to the tenant as the Party and the landlord as the Person responsible (possibly via an LA\_Responsibility or a note in the source document). Including tenants in the system may be optional (since informal tenancies change frequently), but at least for more formal rental agreements it's feasible. Doing so makes the landlord-tenant relationship part of the land record: for instance, if an owner tries to register a sale, the existence of a tenant right could prompt the system to ensure the tenant is notified or compensated according to law. In Dome, where tenants fear sudden eviction, having their occupancy officially noted (even if not as strong as ownership) would give them visibility and possibly some protection. Therefore, the LADM extension would treat leaseholds and tenancies as first-class interests. I would add attributes to capture terms of lease (e.g. duration or expirationDate) and maybe a pointer to the lease contract document (LA\_Source). For rental tenants, an attribute like tenancyType (monthly, annual, etc.) and agreementStatus (written/oral) could be recorded to indicate the nature of their right. By modelling these, I include the secondary occupants of land in the information system – reflecting Dome's reality where who lives on the land (tenant) may not be who owns it (landlord) yet is an important part of the land's story.

## Appendix J, The Data Management Plan

Table 5 The data management plan

Organizing and documenting your data	
Data Organization: 1. How will you organize your data during the project? 2. What can you tell about the quality of the data?	Stored in one folder and well-organised Good
Metadata: 1. What metadata comes with the data? 2. Any metadata missing?	None No
Processing your data	
Versioning 1. What would be your strategy concerning versioning your data files during the project? 2. How can different versions of a data file be distinguished?	The different versions of data files/documents will be structured into different folders By date of creation and names
Protecting your data	
Ethical consideration: Do you think your project requires ethical approval by the ITC Ethics Committee? Why?	Yes Data would be a bit sensitive