Journal of Science and Technology, Vol. 43, No. 2 (2025), pp 1-9

https://dx.doi.org/10.4314/just.v43i2.1

AN ASSESSMENT OF THE LEGAL, INSTITUTIONAL, AND GEOSPATIAL TECHNOLOGY FOR MANAGING URBAN LAND IN ADDIS ABABA AND ADAMA, ETHIOPIA

Diriba Firdisa Tolasa, Emmanuel Offei Akrofi , John Wise Divine Ayer, Edward Matthew Osei Jnr. and Jonathan Arthur Quaye-Ballard

Geomatic Engineering , Department of Geomatic Engineering of the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

***Corresponding author: diribafirdisa@yahoo.com**

ABSTRACT

Securing land tenure is essential for any nation hoping to preserve its natural resources and prosper sustainably. When the state formally recognises a landowner's rights, they are granted secured land tenure. People with insecure tenure may be forcibly removed from their land, which can result in starvation, poverty, and occasionally violent outbursts. The Ethiopian government established land registration and information institutions aimed at establishing cadastral system in order to address complicated land issues in Ethiopia. The establishment of a contemporary cadastral system necessitates extensive and efficient institutional, legal, and geospatial technology. The aim of the research was to assess the effectiveness of land registration and information institutions in terms of legal and institutional, geospatial technology, dispute resolution, and prevention measures for improving tenure security in Addis Ababa and Adama, Ethiopia. Twenty-one experts from the land registration and information bureau completed closed-ended questionnaires providing quantitative data, which was tabulated and presented in a table. The research findings demonstrated that land registration and information institutions in the study area had implemented effective practices related to geospatial technology (80%), legal and institutional frameworks (74%), and dispute resolution and prevention (71%), all of which improve urban tenure security. The study suggests that the Ethiopian government should support the current procedures pertaining to geospatial technology, legal and institutional frameworks, as well as dispute resolution and prevention within land registration and information institutions to further enhance urban tenure security.

Keywords: *Ethiopia, Land tenure security, urban land, Agency, Land registration*

INTRODUCTION

According to Moreri (2020), urban land tenure regimes in many Sub-Saharan African nations are informal and traditional, frequently without official registration. The World Bank (2017) reports that 90% of land in Africa is unrecorded, and 70% of the world's population lacks a formal record of their tenure (GIZ, 2019). According to McDermott *et al*. (2018), about 70% of land in developing nations was deemed insecure or unregistered in 2016. Once more, thirty percent of urban residents in underdeveloped countries lived in slums, where tenure rights were not always formally recognised. People may be forced to relocate if their land is not secure. According to Antonio *et al*., this causes hunger, poverty, and social unrest to rise (2021).The issue of improperly registered urban land tenure in many African countries can be attributed to weak legal systems, inadequate institutional arrangements, and a lack of modern geospatial technology (Antonio *et al*.,2021).

There have been three major land tenure eras in Ethiopian history, each influenced by political and historical circumstances. The tenure systems in place prior to 1974, the socialist or Derge period (1974–1991), and the EPRDF period (1991–present) are among these periods (Chala, 2016).

The state and feudal lords possessed the majority of the land in Ethiopia before 1974 when the country had a feudal system of land tenure. The different tenure arrangements that citizens used to obtain land frequently mixed traditional and land tenure practices. Various tenure regimes for land were in operation at the same time. According to Chala (2016), these included church land, communal, private, state, rist/ kinship, and more.

A new socialist ideology was developed when the Derge came to power in 1974. As a result, the land access techniques and agricultural system were changed. The idea of "land to the tiller" was 5introduced to signify individual property ownership, and a peasant organisation was founded to encourage cooperative farming.

After the Derge was overthrown in 1991, a new federal constitution and government were established (Crewett & Korf, 2008). The 1995 constitution established the Federal Democratic Republic of Ethiopia (FDRE), which places government and sovereignty over all lands under the jurisdiction of the Ethiopian people. Publicly owned land may not be sold, exchanged, or mortgaged, either in an urban or rural setting, according to sub-article 3 of Article 40 (FDRE, 1995).

In Ethiopia, land tenure is currently nationalised, meaning that the state controls resources and land while people have usufruct rights. Still, traditional land tenure systems with an impact from clan and community leadership are in place in some areas, like Afar and Somalia (Reda, 2014).

The Ministry of Urbanisation and Infrastructure currently oversees Ethiopian urban land through urban leasehold. The Urban Development and Management Bureau and the Land Registration and Information Agency are the two organisations in charge of managing urban land in Addis Ababa and Adama. Although the latter is involved in land registration and offers cadastral digital maps, the former concentrates on issues related to urban land governance.

By amending Proclamation No. 818/2014 on urban landholding registration, the Ethiopian government established Land Registration and Information Agencies (FDRE, 2014). In Addis Ababa and Adama, these agencies have lately started land certification and registration initiatives. These land registration and information bureaus need to be supported by robust institutional frameworks, technology systems, and laws.

The purpose of this study is to evaluate the effectiveness of current legal, institutional, and geospatial technologies in Land Registration and Information Agencies. This study is justified as Ethiopia's current system of urban land registration and certification has not received any major evaluation. Based on its results, the study makes recommendations for improving urban land management in Ethiopia.

MATERIALS AND METHODS

Study Area

For this study, Adama and Addis Ababa (sometimes referred to as Finfinnee) cities were purposely chosen (Figureure. 1). The reason for purposely choice of Addis Ababa and Adama as the study area was driven by the ongoing work of landholding registration and verification in these cities. In particular, Addis Ababa was selected as a pilot test area before the cadastral survey was extended nationwide across Ethiopia. In accordance with Federal Proclamation No. 818/2014, the Oromia Regional State initiated the Urban Land Tenure Registration and Land Information pilot project in Adama city in 2017. Geographically, Addis Ababa is situated between 38°38''E and 38°54''E longitude and 08°49''N and 09°05'N latitude. The elevation of the city ranges from 2326 to 3,000 meters. It stretches from Bole International Airport in the south to Entoto Mountain in the north. Adama, one of Ethiopia's largest cities, is located in the East Shewa zone of Oromia. The latitude and longitude of Adama Town are 08°26'15'' and 08°37'00''N, and 39°12'15'' and 39°19'45''E, respectively. The elevation of this community is 1712 meters above.

Out of the 10 Addis Ababa sub cities, five were specifically chosen for the questionnaire survey based on their locations. Nefas Silkii Lafto sub-city (West), Gulele sub-city (North), Chirkos sub-city (Central), Bole sub-city (East), and Akaki Qaliti sub-city (South) are among these chosen sub-cities within Addis Ababa metropolis.

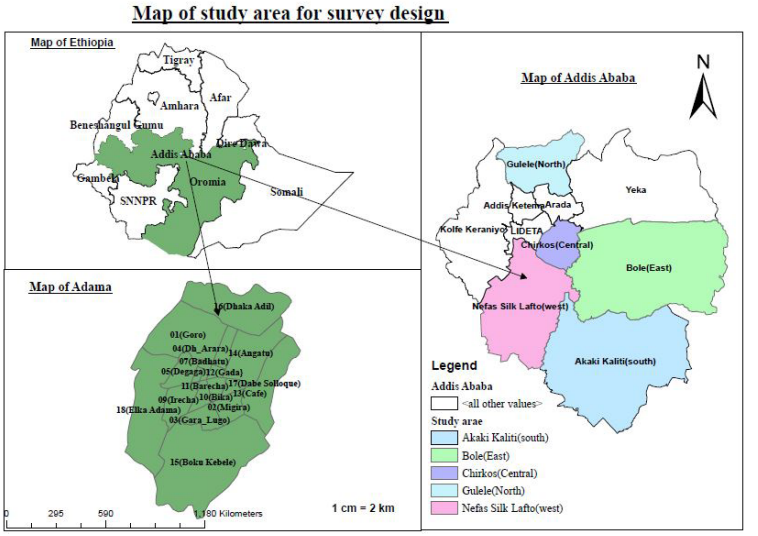

Figure. 1: Map of the study area
Source: Authors, 2023

Data Approach and Collection Methods

The primary objective of this study was to examine the legal framework, institutional arrangements, and technological systems for tenure security in the two Ethiopian cities of Addis Ababa and Adama. Each of the legal and institutional arrangements, framework, geospatial technological, and dispute resolution and prevention aspects is further divided into different dimensions (see Appendix 1). Each dimension is assigned a score, denoted as A (very strong), B (strong), C (weak), or D (very weak).

Sampling Techniques

The study employed a non-probability sampling technique. Three professionals with diverse backgrounds were deliberately selected from each sub-city within the Land Registration and Information Agency. The selected professionals included experts from GIS or surveying, lawyers, and land administration. A total of 21 experts from the Land Registration and Information Agency were purposively chosen through this non-probability sampling technique for the questionnaire survey in both cities.

Data Analysis Method

Data analysis involved counting the frequency of each score (A, B, C, and D) assigned to different dimensions for each aspect. The results of the statistical investigation were presented in tables.

RESULTS AND DISCUSSION

Geospatial Technology Aspect

Modern geospatial technology plays a significant role in enhancing secured land tenure and offers systems for recording land information systematically (Hull *et al*., 2022). Various surveying technologies are currently utilised worldwide to record land tenure, promoting secure land tenures. GIS technology, in particular, is employed for digitising, storing, editing, analysing, and merging spatial and attribute data (Liman, 2021).

Table 1 shows the scores for the geospatial technology aspect of Addis Ababa and Adama cities, and both cities. Data for this aspect was collected from seven geospatial technology (GIS or Surveyor) experts, including five experts from Addis Ababa and two experts from Adama. This aspect comprises five dimensions, resulting in 35 possible scores.

Table 1. Geospatial Technology aspect

Scores	Frequency		Total
	Addis Ababa	Adama	
A	13	6	19
B	5	4	9
C	6	0	6
D	1	0	1
Total	**25**	**10**	**35**

The four scores (A, B, C, and D) were generally assigned differently for Addis Ababa and Adama cities, as depicted in Figureure 2. In the case of Addis Ababa, the highest score was consistently A, while for Adama, A was also the dominant score for this aspect. This

outcome indicates that both cities exhibit a strong inclination toward technology systems. Importantly, it suggests that Adama city has more abundant geospatial technology as compared to Addis Ababa city, as Figureure 2 depicts.

As indicated in Figureure 2, the overall highest score for the geospatial technology aspect is A, with 19 scores, representing 54% of the total. Furthermore, 80% of the scores fall into the strong practice category, while 20% are categorised as weak practice. In light of this assessment, it is evident that the Land Registration and Information Agency demonstrates strong technology systems to enhance tenure security in the study area.

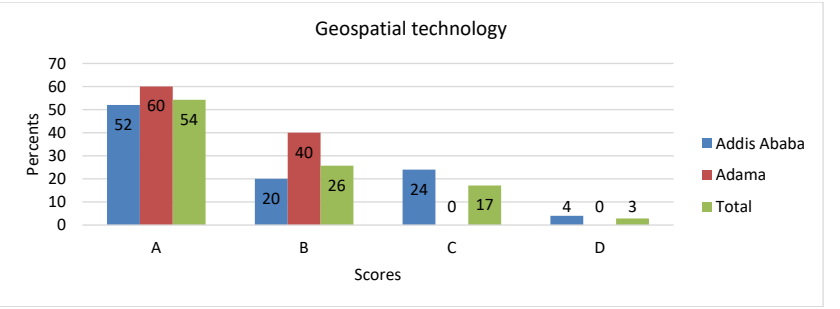

Figure 2: Geospatial Technology

Legal and Institutional Framework Aspect

The legal framework includes all documents related to the legal rights of land ownership and the legal procedures for land registration. This framework plays a pivotal role in ensuring land tenure security (Kiddle, 2020). The institutional framework is the setup responsible for implementing the legal framework at the national or local level. This framework has a crucial role in the implementation of legal and policy frameworks (Nega *et al*., 2021). Table 2 presents the scores for the Legal and Institutional Framework aspect for both Addis Ababa and Adama cities, as well as the overall assessment. Data for this aspect was gathered from seven legal experts. This aspect comprises seven dimensions, resulting in a total of 49 possible scores.

Table 2.Legal and institutional framework aspect

Scores	Frequency Addis Ababa	Adama	Total
A	10	2	12
B	15	9	24
C	10	2	12
D	0	1	1
Total	**35**	**14**	**49**

The four scores (A, B, C, and D) were generally assigned differently for Addis Ababa and Adama cities, as evident in Figureure 3. The highest score predominantly fell under the B category for Addis Ababa and Adama cities for this aspect. This outcome suggests that both cities exhibit a closely related practice in their Legal and Institutional Frameworks. This implies that Adama city's Legal and Institutional Arrangements within the Land Registration and Information Agency are more extensive than those in Addis Ababa city.As shown in Figureure 3, the overall highest score for the Legal and Institutional Framework aspect is B, accounting for 24 scores, representing 49% of the total. Furthermore, 73% of the scores fall into the strong practice category, while 27% are categorised as weak practice. In light of this assessment, it is evident that the Legal and Institutional Framework within the Land Registration and Information Agency demonstrates strong practices that hold significant potential for enhancing tenure security in the study area.

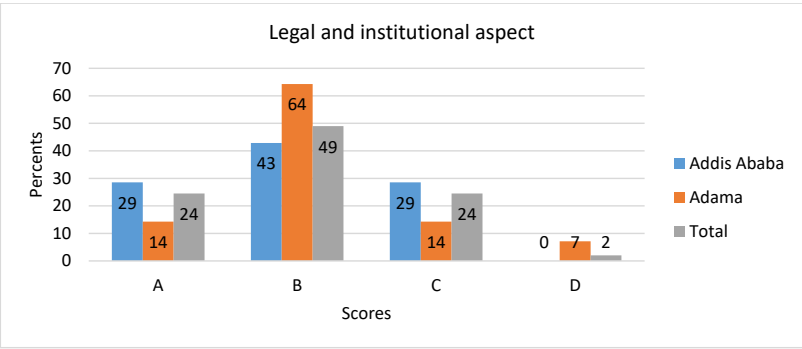

Figure 3: Legal and institutional framework aspect

Dispute Resolution and Prevention Aspect

Encouraging the resolution of land disputes has a significant impact on improving the security of tenure, particularly in nations affected by conflict (Tchatchoua-djomo, 2018). Disputes over tenure can be addressed and prevented through various means. Table 3 presents the scores for the Dispute Resolution and Prevention aspect for both Addis Ababa and Adama cities, as well as the overall assessment. Data for this aspect was obtained from seven Land Administrator experts. This aspect comprises six dimensions, resulting in a total of 42 possible scores.

Table 3.Dispute resolution and prevention aspect

Scores	Frequency Addis Ababa	Adama	Total
A	8	3	11
B	11	8	19
C	11	1	12
D	0	0	0
Total	**30**	**12**	**42**

The four scores (A, B, C, and D) were generally assigned differently for Addis Ababa and Adama cities, as demonstrated in Figureure 4. In the case of Addis Ababa, the highest scores were predominantly in the B and C categories, while for Adama city, the highest scores were predominantly in the B category for this aspect. This outcome suggests that both cities exhibit distinct practices in their approach to Dispute Resolution and Prevention. This implies that the practice of dispute resolution and prevention within the Land Registration and Information Agency in Adama city is more extensive than in Addis Ababa city.As displayed in Figureure 4, the overall highest score for the Dispute Resolution and Prevention aspect is B, accounting for 19 scores, representing 45% of the total. Furthermore, 71% of the scores fall into the strong practice category, while 29% are categorised as weak practice. Based on this assessment, it is evident that the practice of the Dispute Resolution and Prevention framework within the Land Registration and Information Agency is characterised by strong practices, which hold significant potential for enhancing tenure security in the study area.

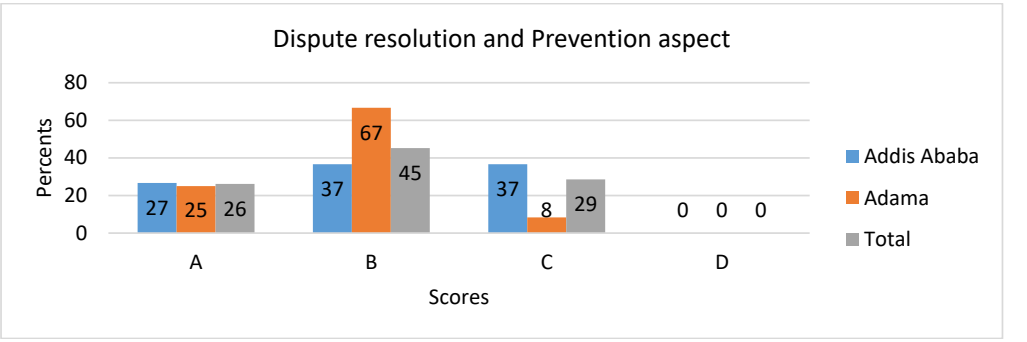

Figure 4: Dispute resolution and prevention aspect

Summary of the Three Aspects

The geospatial technology, legal and institutional arrangements, and dispute resolution and prevention aspects consist of 18 dimensions. Table 4 displays an overall outcome for all aspects.

Table 4. Summary of three aspects

Aspects	Dimensions scores in percent					
	A	B	C	D	A+B	C+D
Geospatial Technology	54.29	25.71	17.14	2.86	80	20
Legal and institutional framework	24.49	48.98	24.49	2.04	73.47	26.53
Dispute resolution and Prevention	26.19	45.24	28.57	0	71.43	28.57

According to Figureure. 5, technology, legal and institutional arrangements, and dispute resolution and prevention were strongly practiced in the Land Registration and Information agency in the study area. Technology, followed by the legal and institutional framework, and dispute resolution and prevention, had the

highest percentage of dimensions (80%) with strong practices. However, this does not imply that none of the dimensions received weak or very weak scores.

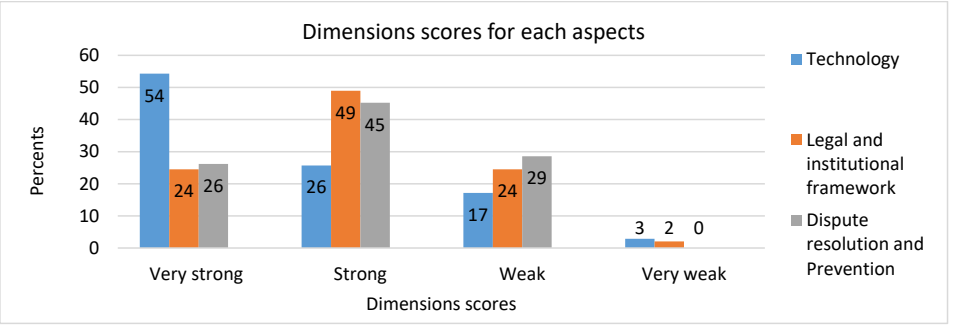

Figure 5: Summary of three aspects

CONCLUSIONS AND RECOMMENDATIONS

The study focused on the legal framework, institutional arrangements, and geospatial technology for tenure security in two Ethiopian cities. The study confirmed that there were different practices for technology, legal and institutional arrangements, and dispute resolution and prevention in Addis Ababa and Adama cities. It revealed that Adama city had a higher level of practice compared to Addis Ababa city. The study also found that there was good modern geospatial technology (80%), legal and institutional arrangements (73%), and dispute resolution and prevention (71%) in the Land Registration and Information Agency to improve urban tenure security in the study area. The study recommends that the Ethiopian government should strengthen the existing practices of geospatial technology, legal and institutional arrangements, and dispute resolution and prevention to enhance urban tenure security.

REFERENCES

Antonio, D., Njogu, S., Nyamweru, H., & Gitau, J. (2021). *Transforming Land Administration Practices through the Application of Fit-For-Purpose Technologies : Country Case Studies in Africa*.

Chala, T. (2016). Analysis of politics in the land tenure system: Experience of successive Ethiopian regimes since 1930. *African Journal of Political Science and International Relations*, *10*(8), 111–118. https://doi.org/10.5897/AJPSIR2016.0919

Crewett, W., & Korf, B. (2008). *Ethiopia : Reforming Land Tenure*. *6244*. https://doi.org/10.1080/03056240802193911

FDRE. (1995). *Constitution of the Federal Democratic Republic of Ethiopia (FDRE). Proc.No 1/1995, Negarit Gazeta Addis Abeba,Ethiopia.* https://doi.org/10.1017/cbo9781139626422.056

FDRE. (2014). *Urban landholding registration proclamation 818/2014.Federal Negarit Gazeta 20th Year No. 25. Addis Ababa, Ethiopia.*

GIZ. (2019). secure land tenure rights for all: a key condition for sustainable development. *GIZ*.

Hull, S., Liversage, H., Rizzo, M. P., & Evtimov, V. (2022). *An Overview of Frontier Technologies for Land Tenure : How to Avoid the Hype and Focus on What Matters*. 1–15.

Kiddle, G. L. (2020). *Perceived security of tenure and housing consolidation in informal settlements : case studies from urban Fiji*. *25*(3).

Liman, A. (2021). *Design of GIS User Interface For Land Management On Some Selected Residential Layout In Nguru Town*. *3*(8), 1073–1083. https://doi.org/10.35629/5252-030810731083

McDermott, M., Myers, M., & Augustinus, C. (2018). *Valuation of unregistered lands: A Policy Guide*. 1–84.

Moreri, K. K. (2020). *Documenting informal and customary land rights in Africa*. *3*.

Nega, W., Tenaw, M., Hunie, Y., & Agegnehu, S. K. (2021). *Evaluating Institutional Dichotomy between Urban and Rural Land Administration in Amhara Region , Ethiopia*. 1–19.

Reda, K. T. (2014). Formal and informal land tenure systems in Afar region, Ethiopia : perceptions, attitudes and implications for land use disputes. *Formal and Informal Land Tenure Systems in Afar Region, Ethiopia : Perceptions, Attitudes and Implications for Land Use Disputes*, *14*(2), 41–62.

Tchatchoua-djomo, R. (2018). I*mproving local land governance ? Exploring the linkages between land governance reforms , institutional pluralism and tenure security in*. *9113*. https://doi.org/10.1080/07329113.2017.1419403