

Research Article

Factors Influencing Peri-Urban Land Development in Ethiopia: Evidences from Assosa City

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Abstract

Like other developing countries, Ethiopia has adopted its land administration system (LAS) based on socio-economic, environmental, and administrative circumstances to allocate and use the land. However, the two ineffective lines of urban and rural land tenure guidelines and legal frameworks play a surprising strategic role in access to land and peri-urban land development. Comprehensive land policies are prospects for today's peri-urban areas to become tomorrow's huge cities. This paper aims to investigate the factors influencing peri-urban land development in Assosa Town and indicate the design of effective LAS. A mixed research approach was employed, and data was collected from both primary and secondary sources. The sample respondents were selected using purposive sampling techniques and descriptive and inferential statistical data analysis methods were employed. The findings revealed that bifurcated and ineffective legal and institutional frameworks, limited public-private participation, and technical constraints adversely affect peri-urban land development. The dichotomized land use development has neglected urban fringe areas and contributed to the prevailing negative peri-urban land developments. Development resulted with limited access to serviced land and deprived of land development permit. Following this, peri-urban landholders became a crucial contributor to the development of peri-urban land in a negative manner. Almost all sampled households developed their land contrary to the legal frameworks and standards. The estimated results of the binary logit model indicate that several factors influence peri-urban land development, including sex, monthly household income, access to official land and land information, land disputes, the alternative land development tool, and institutional integration. It is recommended to have an all-in-one land policy and administration strategy to promote sustainable development in the study area and beyond.

Keywords

Peri-urban, Factors, *Dichotomized land administration*, Land Development, Negative Land Development, Assosa City

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1. Introduction

Peri-urban areas, referred to as the urban-rural interface, consist of fringe, periphery, outskirts, hinterland, and edge land [1, 2]. These areas represent a critical transition zone that enables urbanization and sprawl within rural settings. This tendency for urbanization and built up structures makes peri-urban areas vulnerable to the risk of agricultural land loss [3]. As highlighted by [4], uncontrolled urbanization significantly influences land-use changes and sustainable urban development.

Peri urban land development is prevalent in Ethiopia. Peri-urban land-use identities have been considerably altered and irregularly developed due to bifurcated land administration guidelines and ambiguous legislation governing land-use management, among others [5-9]. The dual urban-rural land administration system continues to influence efficient land use management [10, 11]. Given this, implementing flexible policies that reconcile divergent governance and regulatory tools is more critical than expanding the boundary between rural and urban landscapes to protect peri-urban land [12].

In the peri-urban context, overlapping legal, institutional, and governance frameworks pose greater challenges than different components of the land, rendering these areas neither entirely rural nor fully urban. These areas are perceived as urbanized centers with low-density sprawl [13]. They are linked with the metropolitan economy, undergoing continuous transformation, and characterized by a fusion of rural and urban activities [14]. Recent researches indicate that the hybrid urban-rural land administration and management system contribute to informality [15, 16, 9].

While administratively peri-urban areas fall under rural land administration, their usage still comes under the urban land administration institutions. Ethiopia adhered with an isolated institutional framework that lacks proper alignment with the core functions of land administration to implement land policy objectives [17]. Such state worsens issues relating to peri-urban areas and gives rise to problems such as tenure insecurity, environmental degradation, socio-economic challenges, and the promotion of irregular land use changes and developments [17-19].

This study was conducted in the suburban areas of Assosa City, where several influencing factors impact land development. Despite a few recent studies on peri-urban issues [20, 21, 17, 9], there is still limited research on the specific factors influencing peri-urban land development. The researchers are in the opinion that the existing knowledge on the issue under research in this paper does not suffice to create adequate awareness to policy makers and other stakeholders and to convince them to take corrective measures. The paper aims to fill this gap in the literature by examining the factors influencing peri-urban land development and support sustainable development in Ethiopia.

The paper contributes in the form of knowledge advancement, methodology, and policy reform. Theoretically, the findings can contribute to expand the existing state of

knowledge about the factors that influence peri-urban land development in the study area and beyond. In terms of methodology, the paper integrated the legal framework, GIS technologies and socio-economic data to investigate the issues under consideration and can be applied in similar contexts irrespective of geographic settings. On policy and decision-making point of view, the paper aids policy-makers towards effective land development policies that can ensure sustainable development and enhance effective legal reform.

Following this, a review of related literature is made in the second section. The third section outlines the materials and methods. Sections four and five present the findings and discussions of the results, respectively. The final section presents a concluding remark.

2. Theoretical Review: Urbanization and Peri-urban Land Development

Urbanization is a complex socio-economic process that transforms the built environment, converting formerly rural into urban settlements, and also shifting the spatial distribution of a population from rural to urban areas [22, 23]. The relative high urban population growth rate is expected to happen in Africa and Asia in which, by 2050, the two will constitute the largest urban population globally [24]. It is further reported that cities in Sub-Saharan Africa (SSA) are undergoing rapid urbanization and urban expansion with low density developments compromising sustainable development [25].

Ethiopia is one of the populous states in Africa and agriculture is the backbone of its economy, of which 70 to 80 percent of the rural population rely on agriculture for livelihoods [26]. The increasing urbanization in different parts of the country is highly demanding agricultural land in peri-urban areas. The demand for land for settlements and other purposes is creating peri-urban land use land cover changes that pervades agricultural land [20, 21]. Peri-urban land governance has been problematic basically given the fact that there is bifurcated and weak land governance system and limited state capacity to administer the urbanization which is aggravating sustainable development [27, 28]. The [19, 29] recommended states to build effective land administration structures that shall respond to peri-urban areas and regulate informal urban development.

Peri-urban areas in Ethiopia present a practical situation described by ambiguous boundaries and distinct roles for urban and rural land administration institutions. An isolated institutional framework also lacks proper alignment with the core functions of land administration to implement land use policy objectives [17]. This worsens issues relating to peri-urban land management and leads to tenure insecurity since it significantly impacts the lives of many people across all regions [30, 31]. The lack of flexibility and effective land tenure system created tenure insecurity among

peri-urban households and makes them to rely on informal land acquisition [20, 32].

As a result, environmental conflicts, socio-economic challenges, and irregular land use changes are common in peri-urban areas than other place [18, 19, 33]. Overlapping legal, institutional, and governance frameworks pose greater chal-

lenges with low-density sprawl in peri-urban areas [13]. As peri-urban areas with mixed land use and equivalent populations have not been sufficiently defined, various development processes can be situated somewhere between mixed land uses (Figure 1).

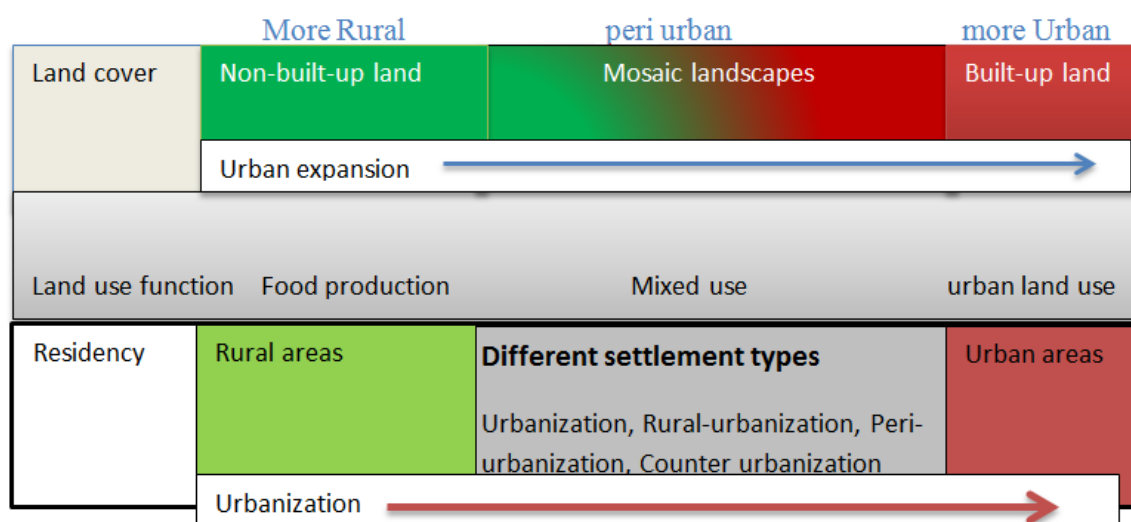


Figure 1. Urban, Rural and Peri-urban land use development [1].

Thus, many cities have evolved into urban centers without proper and adequate land use planning and development control. There is continuous change and rapid process in land use dynamics, often leading to conflicts over land [34, 35]. This usually leads to a substantial increase in illegal land occupation and unequal access to land, leading to irregular land developments. The peri-urban land development is further affected by absence of institutions with technical ability, lack of planning standards, and inadequate legal frameworks [36].

Evidence suggests that the bifurcated system of land administration does not handle peri-urban areas in particular and sustainable development in general [21, 25, 17, 9]. According to [28, 16, 9], the hybrid urban-rural land administration and land governance system contribute to informality. According to [9], the institutional separation has made difficult implementing legislation, and improving suburban land use and governance. Therefore, determining peri-urban zones was complicated by a divided system of land administration, inefficient institutional and regulatory structures, and professional limitations [36]. The majority of academics today favor the creation of overarching ideologies for land administration to address the peri-urban challenges and paradox of failing to meet goals [17, 37].

The study was carried out in the Assosa Town peri-urban areas where the bifurcated and non-responsive nature of legislative and management level frameworks, and technical constraints setback appropriate land tenure and land use

planning interventions and institutional implementations. Therefore, the state of existing knowledge indicates that the issue of factors influencing pre-urban land development is not adequately studied in the study area.

3. Material and Methods

3.1. Study Setting

Assosa City is the capital city of the Benishangul Gumuz National Regional State, which is located in the Northwest of Ethiopia and shares borders with the Oromia National Regional State in the south, the Sudan Republic in the northeast and the Amhara National Regional in the east. Located 659 km west of Addis Ababa and 914 km south of the Grand Ethiopian Renaissance Dam (GERD), Assosa City is found within the coordinates of 10°04'N and 34°31'E, with an elevation of 1,570 meters (Figure 2).

We chose Assosa City as a study area because of high demand of land given that the City is the political and economic center of the region; the recorded high rate of urbanization and urban population growth; high level of informal land developments in the peripheries; access to information from government institutions and households has been relatively easy and the possibility to generalize the findings.

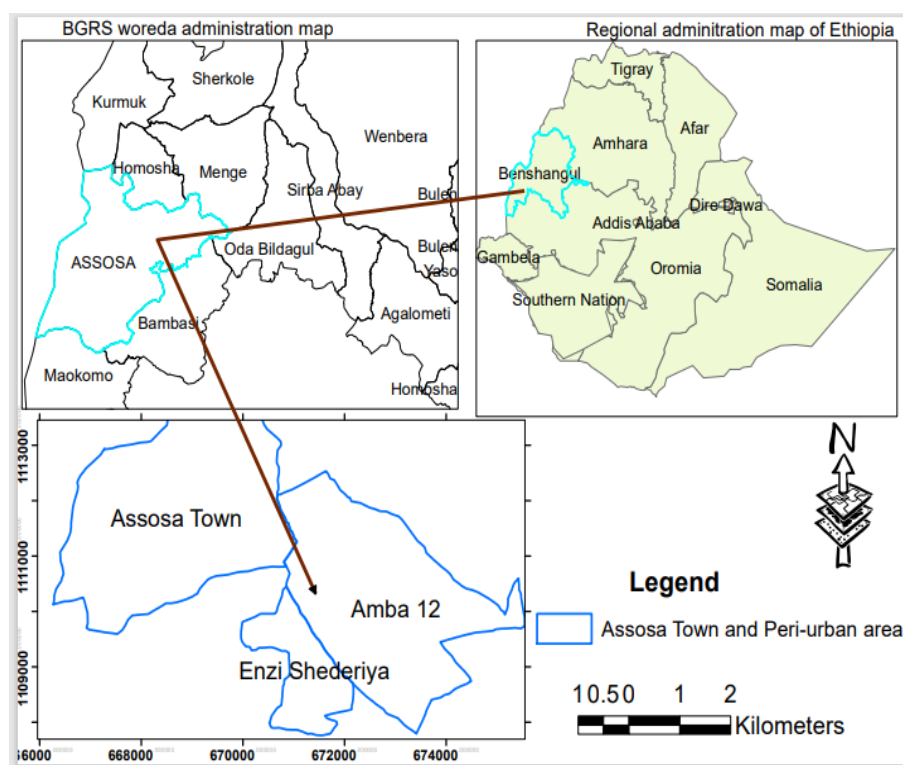


Figure 2. Location map of the study area (researchers).

3.2. Research Design and Approach

The paper is based on mixed research approach. Both qualitative and quantitative data sets were collected simultaneously to ensure triangulation among various data sources

(figure 3). According to [38], to achieve the study's goals, both types of data sets were simultaneously collected at one moment in time with diverse instances using a concurrent mixed research design. Concurrent mixed-methods research was therefore preferred to maintain triangulation among those data sources [39].

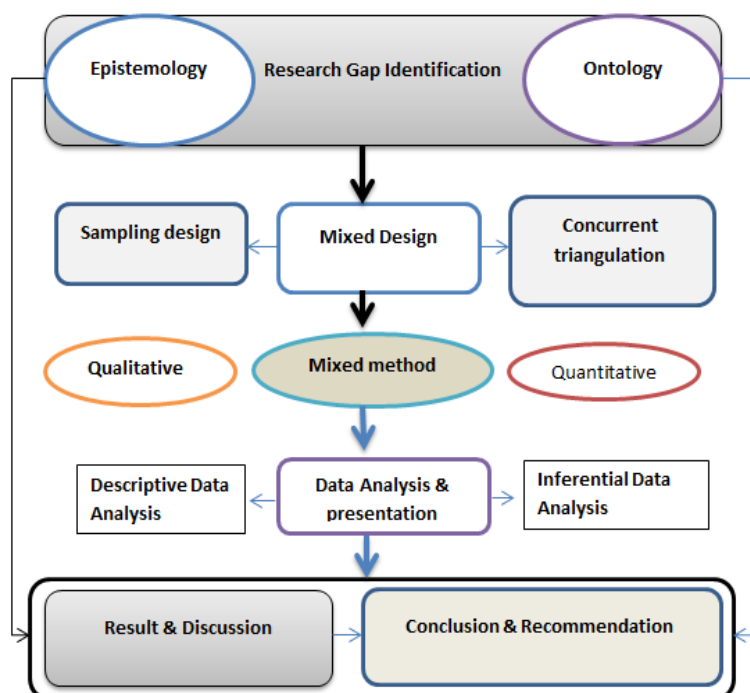


Figure 3. Frameworks for research design and methods.

3.3. Data Source and Instrumentations

Primary and secondary data were gathered from peri-urban landholders and from selected woreda offices, town administration, urban land development and management office and kebeles using various data collection instruments.

Questionnaire: The survey questionnaire was developed for both qualitative and quantitative data to obtain an understanding of the relationship between data in the study area. A closed and open-ended questionnaire was employed to obtain cases. It was administered within peri-urban households and to the key informants as necessary.

Interview: This instrument used to reimburse the non-respondent rate and cases not addressed by the questioner. The semi-structured and structured questionnaire was interviewed with selected key informants and peri-urban households face to face to assess the attitude and adhere what is going on in practice for clear imagination towards the nature of the case in the study.

Focus group discussion (FGDs): This instrument also used with both urban and rural land administration office experts, kebele committees, and households. This is the researcher immerses himself to cross-check and recap further understanding of the reality.

Observation: Both structured and semi-structured observation are utilized for evaluating the status of institutional structures and transparency, the condition of land policy treating the vulnerable groups and other land-related cases at the office and direct observing in the field about rural-urban land use planning, tenure security, administration boundary and spatial pattern of per-urban developments in general.

Content Analysis: It is a process for systematically conceptualizing quantitative and qualitative descriptive messages via analyzing up-to-date document materials and grounding theory as well as an inference from descriptive sourced data.

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3.4. Sampling Technique

To address the objectives of the research, two peri-urban kebeles (Enzishedariya and Amba12) were selected purposively. These study areas have been experiencing significant conversion of rural agricultural land to formal and informal built-up areas due to high demand for urban development. Due to the rapid dynamicity of the peri-urban population, informality, and the implicit dichotomy of the urban and rural population, the exact total number of the population who are living in the peri-urban area settings is not exactly known. Thus, the proportional sample size determination formula is employed [40, 41]. The formula considers the high proportion of variations among the population concerning specific conditions [41, 42]. The sample size is determined based on the following formula:

$$\frac{Z^2 pq}{e^2} = \frac{Z^2 p(1-p)}{e^2}$$

Where n is the sample size, Z score at a specified confidence interval, e is the desired level of precision. The proportion of the population (p) is the estimated proportion of an attribute that is present in the population used 0.5 and q is $1 - p$. Thus, the sample size of the study was calculated with the assumption of 95% confidence level which gives a Z value of 1.96 from the Z table, 5% margin of error and p is 0.5. Therefore, based on the above assumption and formula, the total number of sample size is $1.96^2 \times 0.5(1-0.5)/0.05^2 = 384.16$. Thus, considering 10% non-respondent rate and design effects ($2 \times$ sample size) of sampling techniques is recommended to increase sample representation. Therefore, the total number of the sample size equals to 808 (Table A2).

The paper employed purposive sampling to select the respondents due to: (a) the study focused on peri-urban households who hold land or houses given that these people are the principal supplier and actors for property formations [43]; (b) due to the rapid dynamicity of the peri-urban population, the prevailing informality, and the unclear dichotomy of the urban and rural population. To overcome the effects of purposive sampling in inferential statistical analysis and representation of population, the study used the design effects ($2 \times$ sample size) [44].

3.5. Data Analysis

The survey data were subject to descriptive and inferential statistics and analyzed using the Statistical Data software (STATA_14). A binary logistic regression model was employed to assess how two or more independent variables influence changes in the outcome variable. Logistic regression assumptions were tested and the multicollinearity of categorical explanatory variables was examined using the variation influence factor. The significance level for categorical variables was also determined through chi-square test. In the

descriptive analysis, the GIS software and distribution of frequency and contingency tabulation were utilized to measure variability among the variables.

For qualitative inquiry, data collected from interviews and focus group discussions was analyzed using thematic analysis. Content analysis was employed to analyze document based sources. The combination of mixed methods allowed for a comprehensive investigation, enhancing the understanding of the research subject and providing valuable insights into the study's outcomes.

3.6. Model Specification

Table 1. Summary of Outcome, Treatment and Independent (Own Design, 2023).

No	Code	Variables Descriptions	Variables Type	Measurement of Variables in (Value)	Expected Sign	
					LUDC	ASL
1	LUDC	Land Use Development Control	Dummy	Dependent Variable (peri-urban land development is in line with land use development control/approval), (Yes = +ve; No= -ve)		
	ASL	Access to Serviced Land	Dummy	Dependent Variable (peri-urban land development having access to basic service), (if yes =+ve; otherwise= -ve)		
2	AG	Age of households	Continuous	Age of peri-urban land holders/households in years		+/-ve
3	SEXHH	Sex of households	Dummy	Sex of the peri-urban respondent (1=Male and 0= Female)		+/-ve
4	MAR	Marital Status	Dummy	Marital status of households (1= married, 0=otherwise)		+/-ve
5	EM	Employment type	Dummy	Households employment (1= employed, 0= otherwise)		+/-ve
6	IN	Income of peri-urban households	Dummy	Households having low monthly income according to (1= low and 0= otherwise)		-ve
7	UFLA	Understanding of Formal Land Acquisition	Dummy	Households understanding formal way of land acquisition (1=yes and 0= no)		+ve
8	MAL	Modalities of Access to Land	Dummy	If households access land from land administration institutions (1= yes, 0= otherwise)		+ve
9	TS	Tenure security	Dummy	If peri-urban land holders feel tenure insecurity (Ideas to loss real estate); (1=yes and 0= no)		-ve
10	ALI	Access to land information	Dummy	Access to secured land information from land administration institutions (1= yes, 0= otherwise)		+ve
11	SD	Service delivery	Dummy	Service delivery of LAS to peri-urban households is easy to understand and cost effective (1= satisfied and 0=otherwise)		+ve
13	OS	Organizational support	Dummy	If peri-urban households supported by governmental or non-governmental organizations (1=yes and 0= no)		+ve
14	CPLD	Common peri-urban land disputes	Dummy	Frequent peri-urban land related disputes (1= informal holding and boundary, 0=otherwise)		-ve
15	P	Participation	Dummy	Active household participation in peri-urban land use land development (1=yes, 0=no)		+ve
16	II	Institutional Integration	Dummy	If there is strong integration and communication among urban-rural institutions (1= yes, 0= otherwise)		+ve

No	Code	Variables Descriptions	Variables Type	Measurement of Variables in (Value)	Expected Sign	
					LUDC	ASL
17	LDT	Land Development Tool	Dummy	peri-urban household need to have alternative and cost effective land development tool (1= yes, 0=no)		+/-ve
18	IU	Institutional Unification	Dummy	Perception of households on institutional unification to address peri-urban land development issues (1= yes, 0=no)		+/-ve

The two possible outcomes pertain to whether the factors positively influence peri-urban land development or not. Consequently, the appropriate representation for the dependent variable would be a dummy variable taking on the values 0 and 1. Specifically, if $Y_i = 1$, it indicates that the factors have a positive influence on peri-urban land development, implying improved access to serviced land and development that aligns with an urban or rural land use plan or development control. Equally, if $Y_i = 0$, it suggests that the factors have negative influence on peri-urban land development (Table 1). Thus, the formula of the binary logistics regression model is:

$$\text{LN} [P_i/1-P_i] = \beta_0 + B_1X_1 + B_2X_2 + \dots + \beta_nX_n$$

Where; P_i is the probability of outcome and β_0 = Coefficient. $B_1 - \beta_n$ = Regression Coefficients representing the contributions of each independent variable $X_1, X_2 \dots X_n$ to the predictors of independent variable Y . $\text{LN} [P_i/1-P_i] = \text{pe-}$

ri-urban land development.

4. Findings

4.1. Demographic Factors

The article assessed the associations between peri-urban land development and the demographic and socio-economic status of the sampled households. Nearly half of the respondents were female. The survey highlighted that households with higher monthly incomes were more likely to have positive land development in peri-urban areas compared to those with lower monthly income. The chi-square test revealed a statistically significant difference between gender and income about land development among peri-urban households (Table 2).

Table 2. Socioeconomic and Demographic Descriptions (survey result, 2023).

		Peri-urban land development						
Variables	Description of variables	Informal		Formal		Total		X ² (P-value)
		frequ	Perc	frequ	Perc	freq	Perc	
Gender	female	401	49.60	0	0.00	401	49.60	13.73 (0.003)
	male	398	49.30	9	1.10	407	50.40	
Employment	Otherwise	672	82.11	25	7.72	697	86.26	6.77 (0.009)
	Unemployed	111	17.89	0	0.37	111	13.74	
Marital Status	Married	585	72.41	25	3.09	610	75.5	8.038 (0.005)
	Otherwise	198	24.5	0	0	198	24.5	
Monthly income	Low	343	253	42.55	0	0	343	11.205 (0.000)
	Otherwise	440	340	54.46	25	3.05	465	

Regarding marital status, approximately three-fourths of the sampled households were married, while around one-tenth

of the respondents were single. Additionally, 6.31% were divorced, and 7.92% were widowed. Concerning employment status, 46.66% of households were employed by the government, while nearly 30% were self-employed. Unemployed respondents constituted approximately 9%, and about 4.7% were daily laborers, with the remaining 16.83% being farmers. The descriptive statistics offers valuable insights into the characteristics and attributes of the sampled households, shedding light on the potential factors influencing peri-urban land development in the context of Assosa City.

4.2. Modality of Land Access

About 62% of the sampled households acquired their land from peri-urban landholders through sale. Nearly 18% of the

respondents obtained land from their relatives through donation or inheritance, while 16.08% accessed land through land administration institutions (Figure 4). The findings from interviews and FGDs with Kebele Land Administration and Use Committee and land administration experts revealed that the existing land tenure system is not conducive to provide egalitarian access to land. This increased landlessness among poor and low-income households, which is one of the contributing factors to the prevalence of informality in peri-urban areas. The statistical analysis confirmed a significant association between the modality of acquiring land and peri-urban land development at the zero percent level ($X^2 = 91.28$ and $P = 0.000$). The findings shed light on the relationship between knowledge about formal land access, land acquisition methods, and peri-urban land development.

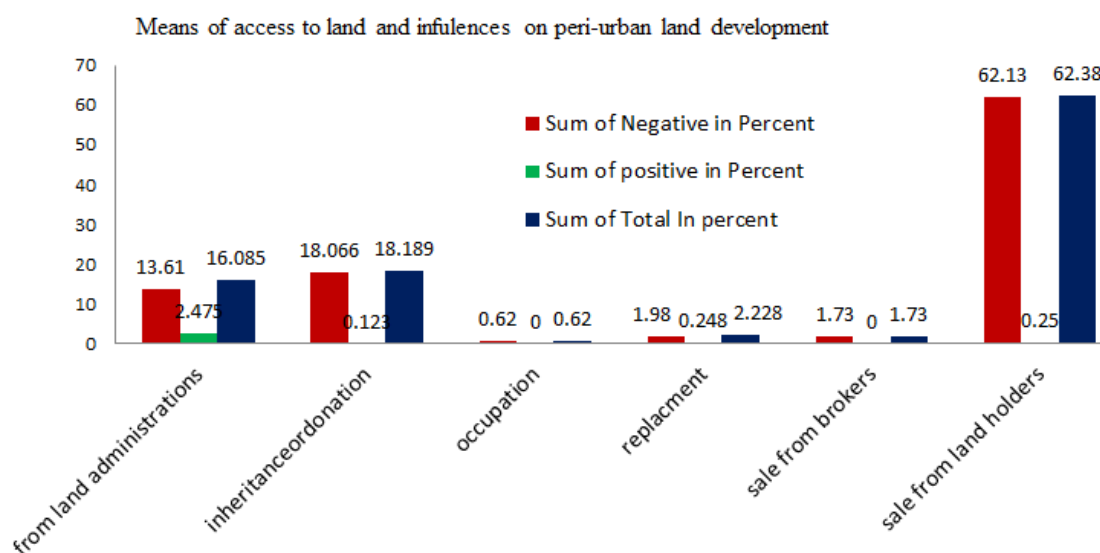


Figure 4. Land Acquisition Modalities (survey result, 2023).

Moreover, the qualitative survey results from team leaders and heads revealed that formal access to land is mainly influenced due to shortage of land supply and propensities towards informality to access land. The empirical data indicate that neither rural nor urban land tenure systems are efficient to address the land demands and properly administering the peri-urban areas.

4.3. Access to Land Information and Information Security

Most of sampled households' access land information from

the informal land market and they were insecure about their land information (Figure 5).

The statistical analysis revealed a significant relationship between land information delivery and peri-urban land development, with zero percent significance level. Data from rural land administration professionals showed that the National Rural Land Administration Information System enables the automation and security of information systems. Yet, in peri-urban areas, it was challenging to find reliable and easily accessible information due to the absence of responsible institutions and legislation to enforce proper land information management.

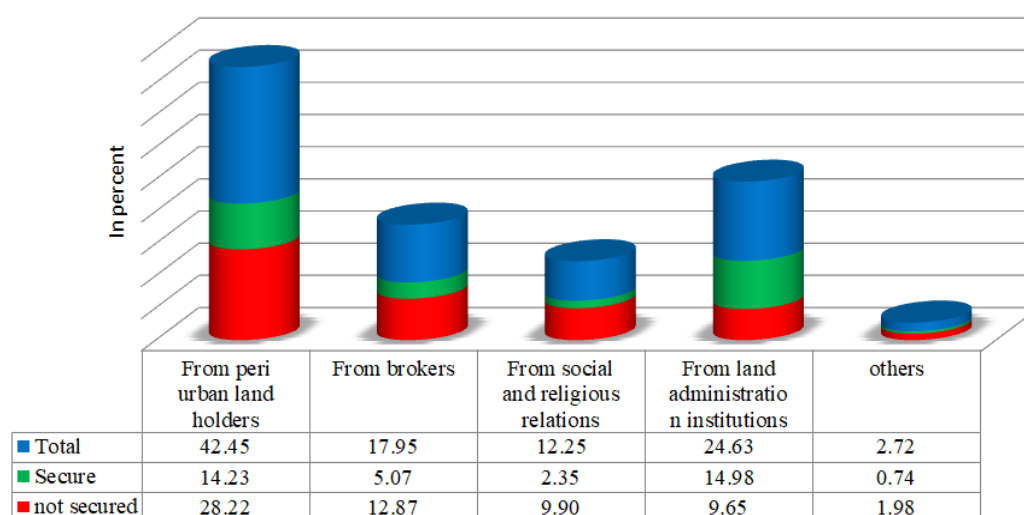


Figure 5. Modalities of access to land information (survey result, 2023).

4.4. Tenure Insecurity

The survey's findings show that tenure insecurity affects 59.90% of peri-urban households. About 55% of peri-urban households with informal land acquisition and construction experience tenure insecurity. Interview results indicate that the absence of landholding certificate and land use approvals is the main sources of the insecurity. Even certified peri-urban landholders are doubtful about their tenure security, primarily

due to concerns about the government's land-taking process. Tenure insecurity further influences poor and substandard land use development, causing it to shift away from the urban centers and towards the rural fringe. There is a significant difference between household tenure security and peri-urban land development at zero percent significance level ($X^2 = 22.88$ and $p = 0.000$) (Table 3). These results suggest that the presence of dual and inefficient tenure systems contribute to tenure insecurity in peri-urban areas.

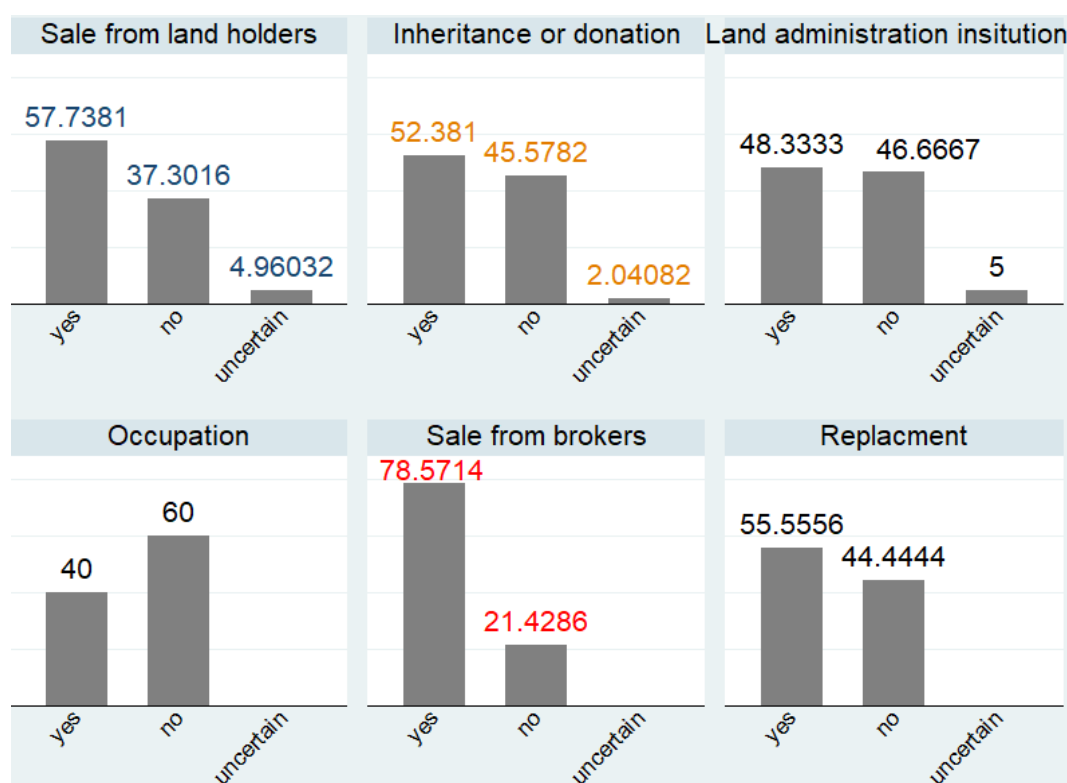


Figure 6. Modalities of access to land and Tenure insecurity in Peri-urban areas (Survey result, 2023).

4.5. Land Related Conflicts

The analysis identified common land disputes involving peri-urban areas. Accordingly, about 73% of the sampled households stated that informal holding and boundary disputes were frequent issues, resulting negative land improvements in peri-urban. Contrarily, almost 13% of land disputes involved inheritance or donations, nearly 9% involved land use conflicts, and 5% involved other issues. There is a statistical difference between common land related conflicts and peri-urban land development, as shown by the statistical significance level of zero percent (Table 3). Key informants and interviewees mentioned that the ambiguous administrative boundary in the bifurcated system of land administration is causing land related conflicts.

4.6. Alternative Land Development Tool

Majority of the respondents (92.58%) agreed with the

proposed alternative land development approach, while a small percentage of households (7.42%) disagreed about future peri-urban land development approaches. The chi-square test indicated a significant link between the urban-rural fringe land development tool and households, with a zero percent level of significance (Table 3).

According to the discussions with experts and team leaders, there is no explicitly articulated land legislation addressing peri-urban land development. Expropriation as a land development tool is found inefficient and a cause for insecurity. This supports the finding of [45], who stated that expropriation makes peri-urban farmers disadvantaged due to the low compensation rate, which is not followed by resettlement. Interviewees called for inclusive, pragmatic, and pro-poor land development tool that fosters viable urban-rural linkages and balanced development.

Table 3. Factors Influencing Peri-urban Land Development (survey result, 2023).

Variables	Description of variables	Peri-urban land development						
		Informal		Formal		Total		X ² (P-value)
		frequ	Perc	frequ	Perc	frequ	Perc	
Formal land acquisition	yes	198	22.77	14	1.73	198	24.5	17.387 (0.000)
	no	608	75.23	2	0.247	610	75.45	
Tenure Security	yes	314	38.86	10	1.24	324	40.1	22.88 (0.000)
	no	480	58.02	14	1.85	484	59.9	
Common land disputes	Boundary & Informal holding	568	70.3	14	3.74	582	73.04	13.98 (0.000)
	otherwise	215	26.61	11	1.36	226	26.96	
Land development tool	yes	734	90.84	14.00	1.74	748	92.58	54.93 (0.000)
	no	49	6.70	11.00	1.36	60	7.43	

4.7. Peri-urban Landholders' Participation

There is low level (64.46%) of peri-urban landholders' involvement in peri-urban land-related decision-making. Almost all (89.48%) peri-urban households didn't get any support from either urban or rural land administration institutions. The empirical and key informant data testified that the dichotomized land administration system impacts the exclusion of landholders in terms of advocacy and decision-making power.

4.8. Institutional Setup

Customer satisfaction among peri-urban landholders was assessed to check the adequacy of the institutional setup in land related service delivery. About 16.3% of the respondents replied that institutional service delivery was simple, clear, and cost-effective. 28.10% of the respondents moderately agreed, while 45.79% disagreed. Concerning customer satisfaction, about 30% of sampled households were satisfied, while about 70.18% were dissatisfied with the service delivery.

The chi-square test demonstrated a statistically significant difference between service delivery and customer satisfaction, with significance levels of zero percent and 45 percent, respectively. According to the FGDs and interview results, given that the land administration system is influenced by dual institutional and legislation approach, the land administration institutions lacked cohesion in core processes and key functions of land administration. According to an interviewee,

The land administration system is fragmented in terms of legal and institutional frameworks. The dual institutional approach, with distinct rules and regulations for urban and rural areas, contributed to the complexity in administration and implementation of legislation and policies mainly in the peri-urban areas. The institutions lacked unity within the key elements of land administration.

Regarding institutional integration and communication in peri-urban land development, about 26.11% of the sampled respondents believed that institutional integration was strong. About 59.65% of surveyed respondents considered integration to be weak, while 14.23% of peri-urban households were unsure about the matter. Key respondents from urban and rural land administration offices held that the isolated land administration system contributed to poor institutional integration and communication. Weak institutional integration negatively affects peri-urban land development (Figure 7). The relationship between land development and institutional integration was statistically significant at a zero-significance level ($X^2 = 28.15$, $p = 0.000$).

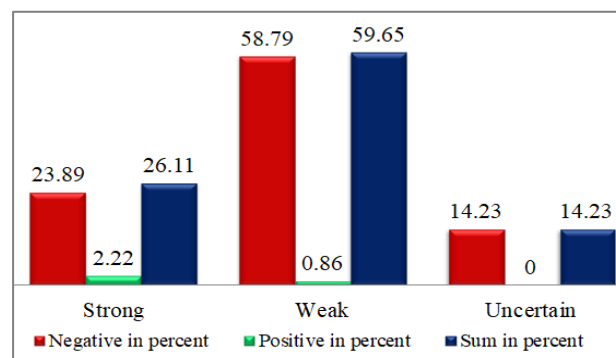


Figure 7. Institutional Integration in Peri-urban setting (survey result, 2023).

4.9. Access to Serviced land, Land Use Approvals and Land Use Cover

Approximately 87% of the sampled households do not have access to serviced land. Due to this, a significant portion of peri-urban households still lack access to basic services. Similarly, around 77% of peri-urban households utilize and develop land without having proper land use plans and development permits.

To understand the peri-urban land use cover and development, a supervised classification based on satellite imagery was conducted. The overall classification accuracy was nearly 95%. It is found that 1.04 km² of agricultural land is transformed into a built-up area, while 1.89 km² of peri-urban land were covered with eucalyptus trees. About 1.6 km² of the peri-urban land are covered by other vegetation and shrubs. The remaining land, totaling 9.13 km², is used for agriculture purpose.

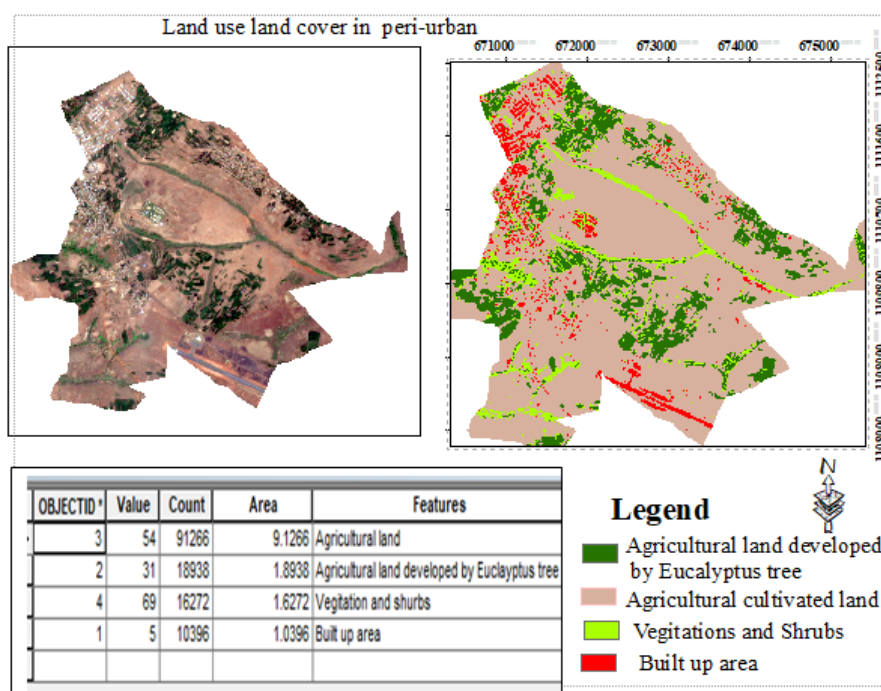


Figure 8. Peri-urban land use land cover (authors' analysis).

Key informants demonstrate that hinterland development was not supported by rural and urban land use and planning control regulations. They emphasized that the fragmented land use and development regulations make it very difficult to implement land development and monitor land uses in the urban periphery. This is inconsistent with rural land use plans [46, 47], which demand the exclusive utilization of rural land for agriculture-related activities and selection of alternative land advantages. Similarly, in the urban setting, the creation of structures should be undertaken by providing the basic services [48].

4.10. Model Summary

The non-parametric test result showed that the 19 explanatory variables were significant ($p \leq 0.05$) in influencing peri-urban land development. To ascertain the influences and

magnitudes of the explanatory variables on dependent variables, the binary logit model was used. Sex, household income, methods of accessing land, access to land information, tenure security, and land development tool were favorable and significant ($p < 0.05$) effects on peri-urban land development. Contrarily, the institutional integration and peri-urban land disputes had negative and significant impact on peri-urban land development. On the other hand, other variables didn't have significant influence on peri-urban land development.

$$\begin{aligned} \text{Peri-urban Land Development} = & \beta_0 + \beta_1 \text{SEXHH} + \beta_2 \text{MA} + \beta_3 \text{EM} + \beta_4 \text{IN} + \beta_5 \text{UFLA} + \beta_6 \text{MAL} + \beta_7 \text{LULC} + \beta_8 \text{TS} + \beta_9 \text{ALI} + \\ & \beta_{10} \text{SD} + \beta_{11} \text{S} + \beta_{12} \text{OS} + \beta_{13} \text{GG} + \beta_{14} \text{CPLD} + \beta_{15} \text{P} + \beta_{16} \text{PLIS} + \\ & \beta_{17} \text{II} + \beta_{18} \text{LDT} + \beta_{19} \text{IU}, \text{ i.e., } \text{Land Development} = \beta_0 + \\ & 5.96 \text{SEXHH} + 1.34 \text{IN} + 1.3 \text{MAL} + 1.73 \text{ALI} + 2.38 \text{CPLD} + \\ & 2.64 \text{II} + 2.05 \text{LDT}. \end{aligned}$$

Table 4. Factors influencing peri-urban land development (survey result, 2023).

Peri-urban land development	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
Sex	5.956671	2.322921	2.56	0.01	1.40383 10.50951
Marital status	-1.017155	1.466934	-0.69	0.488	-3.892293 1.857982
employment	-2.660149	1.55067	-1.72	0.086	-5.699406 0.3791074
Income	1.335382	0.6208844	2.15	0.031	0.1184711 2.552293
Formal land acquisition	0.7079523	0.8065502	0.88	0.38	-0.872857 2.288762
Ways of access to land	1.165364	0.4097794	2.84	0.004	0.3622112 1.968517
Tenure security	0.0488245	0.9113096	0.05	0.957	-1.737309 1.834959
access to official land information	1.311121	0.5089067	2.58	0.01	0.3136823 2.30856
Service delivery	0.3991044	0.8710225	0.46	0.647	-1.308068 2.106277
Satisfactions	0.8110117	0.822333	-0.99	0.324	-2.422755 0.8007314
Supports from any organizations	1.819914	1.920008	0.95	0.343	-1.943233 5.583062
Common peri-urban land disputes	-2.375552	0.6850571	-3.47	0.001	-3.718239 -1.032864
Household participations	-1.053763	0.9083277	-1.16	0.246	-2.834053 0.7265265
Institutional integration	-2.640566	0.9575153	-2.76	0.006	-4.517262 0.7638708
Land development tool	2.049476	0.7436515	2.76	0.006	0.5919457 3.507006
Institutional unification	-0.114352	0.4402893	-0.26	0.795	-0.9773031 0.7485991
_cons	-12.24764	6.454477	-1.9	0.058	-24.89819 0.4028988

Interpretation of Significant Variables

1. Sex of peri-urban households: Sex has positive and significant effect on households engaging in peri-urban land development at a significance level of 1%. Male-headed households are more likely participate in

- positive peri-urban land development than female-headed households. The likelihood of male peri-urban households increases by 5.96 unit probability levels, assuming all other parameters remain unchanged.
2. Peri-urban household income: There is a close agree-

ment between the explanations and the model's results. At a 3% level of significance, it was found to have a considerable ($p < 0.05$) favorable impact on households engaged in peri-urban land development. The model's results show that positive peri-urban land development increases by 1.34 units for every unit rise in monthly income, with other variables being constant.

3. Access to land and real estate: The access coefficient for land and buildings has a positive sign, indicating that households' access to formal land and buildings is more likely to result in positive land development compared to informal land acquisition or built-up property. The likelihood of positive peri-urban land development increases by 1.17 levels when households have access to land that has been developed and regulated by institutions.
4. Access to land information: The model's results showed that urban outskirts' development was significantly and favorably influenced by access to land information at a significance level of 1%. A one-unit increase in access to formal land records increases the probability of positive land development by 1.3 levels.
5. Peri-urban land disputes: It was found to be significant at a considerable level of 0.1%, having a negative effect on peri-urban households' land development. The model indicates that the probability of land disputes in peri-urban land development across households aggravates negative land development by a 2.38 probability level.
6. Peri-urban land development tool: A participatory, economical, and inclusive land development tool was consistent with the hypothesis. The logit model results suggest that when alternative land development tool is used, the likelihood of positive land development activities in peri-urban areas increases by 2.49 levels, other factors remain constant.
7. Institutional integration and communication: Absence of integration of rural and urban institutions negatively affects peri-urban land development across households at a 0.6 percent level. This means that the bifurcated institutional system contributes to weak integration on peri-urban land issues. Negative land development is more likely by a 2.64 probability level due to weak institutional integration and communication.

5. Discussion

The article finds that the modalities of accessing formal land have positive relationship with peri-urban land development. The delivery of formal land is significant ($p < 0.05$) and positively correlated with positive peri-urban land development. The informal land market is the source of land acquisition for about three-quarters of sampled households. This informal tenure system exacerbated negative land development (62.13%) and settlement in peri-urban areas. This result is consistent with the findings of [21, 49], who asserted that the bifurcated land tenure system is not able to deliver formal land acquisition and other

service systems to meet the requirements.

Sex and income have positive and significant influence on peri-urban land development. Accordingly, land is developed better if it is owned by male households. Most groups with low and middle incomes involved in negative land development. This result supports the findings of [50], who showed that the dichotomized land tenure system is inefficient. The modalities of access to official land information had a positive influence on peri-urban land development. This finding is consistent with [33, 51], who identified that information sharing and dissemination is complex in peri-urban land use management and decision-making. Frequent occurrence of illegal land acquisition, inequality in land access, and negative land development in peri-urban areas happened due to contradicting land tenure systems that restrict access to affordable land or housing. The findings are similar to what is asserted by [6, 7, 51].

Moreover, the ineffective bifurcated land institutions and legislation along with inadequate qualified human power have been constraints for land use development and service provision in peri-urban areas. This result is in line with the findings of [20, 52, 53]. Thus, for peri-urban land use development to flourish and, more importantly, to create a convenient environment for present and future generations, there is a need to rethink integrated land use and plan control policies and actions.

According to [54, 55], raising the level of awareness and fostering public participation are inherent to adopt an appropriate framework and achieve the Sustainable Development Goals. In the study area, there is limited public participation in the process of land development. The low level of participation and land development implementation were linked with a lack of operational capacity, technology limitations, and financial constraints [56]. Effective land development tools support efficient urban-rural integral activities and direct overall sustainable development. Adapting pro-poor and gender-responsive alternative land development tools is found pertinent in the study area as suggested by [13].

6. Conclusion

In Ethiopian land administration strategies, managing rural-urban land has been used to conceal peri-urban land and leave it vacant. The interpretation of land jurisdictions is not convincing, and it places peri-urban land neither independently nor specifically managed under the rural-urban dichotomy [57, 21, 17]. As a result, unresponsive and weak institutions related to the land administration process were noticed [58]. Accordingly, tenure insecurity, socioeconomic inequality among smallholder farmers and low-income groups, land use conflicts and disputes pose significant risks in most suburban areas [32, 59]. The inadequate structure of the land administration system hinders the establishment of harmonious land-to-people relations. Unregulated land use patterns directly or indirectly impede the efforts to promote environmentally friendly sub-urban land development. The findings showed that inefficient and

bifurcated legal frameworks significantly contributed to peri-urban land development challenges. Fragmented institutional structure, with undefined responsible institutions in managing land records and governance, also significantly affected peri-urban land development. The ineffective urban-rural institutional setup led to a lack of professional capacity and financial constraints and technical limitations. Besides, weak public participation significantly influences peri urban land development. Majority of peri-urban households engaged in unfavorable land use development without access to serviced land.

The following suggestions can be made in light of the study's findings:

It has been found that the considerable socioeconomic variations among peri-urban households have a substantial impact on how the suburban land is developed. To provide households with access to serviced land and affordable housing, land tenure policy should ensure just access to land for all as an entry point for tenure security.

To operationalize accessible, complete, up to date and secure land information in LAS, in peri-urban areas, encourage and support institutions with cutting-edge technology, qualified personnel, and essential financial resources.

The frequent peri-urban land disputes have a negative and considerable impact on peri-urban land development activities. This is a signal to land policymakers and administration system to give prior attention to the effects of dualistic urban-rural LAS tiers in peri-urban land use conflict and disputes in order to shape sustainability.

The alternative land development tool in the study area found positive and significant influences on peri-urban land development strategies. Therefore, the key to preventing and legalizing informal peri-urban land development is the establishment of mature alternative land development approaches.

The institutional set up and integration in the bifurcated land administration context had a negative and significant effect on the peri-urban development. This suggests that strong institutional integration and unification between LAS be pursued to better address sustainable development.

The lack of private and public participation in land administration concepts and land use development was discovered to be driving undesirable peri-urban land development. It is advised that legal frameworks and institutional capability in LAS shall be reviewed to activate the public-private partnership in peri-urban land development.

All this highlights wake-up call to adopt a comprehensive land policy in administration system, addressing the bifurcation and inefficiencies of institutions that hinder peri-urban land development. Strengthening institutional structures, clarifying roles and responsibilities, and promoting collaboration between public and private sectors are essential steps

towards achieving sustainable and well-planned peri-urban land development.

Abbreviations

FDRE	Fedra Democratic Republic of Ethiopia
LAS	Land Administration System
SSA	Sub Saharan Africa
FGDs	Focus Group Discussions
GIS	Geographic Information System
GERD	Grand Ethiopian Renaissance Dam
STATA	Statistical Data Analysis
KLAUC	Kebele Land Administration and Use Committee
KA	Kebele Administration
LAE	Land Administration Expert

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Data Availability Statement

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

Appendix

Table A1. Summary of Data Source and Instrumentations.

Objectives to be addressed	Methods of data collection	Data sources
Legal frameworks and implementation effects	FGDs, Interview, Questionnaire, Observation	Peri-urban land holders
	Observation & Questionnaire	Heads
	Interview, Questionnaire & Observation	Team leaders
	Questionnaire, Interview & FGDs	Experts and KLAUC/KA/LAE
	Content Analysis	Documented or descriptive sources
Management level influences	Observation & Questionnaire	Heads
	Interview, Questionnaire & Observation	Team leaders
	Questionnaire, Interview & FGDs	Experts and KLAUC/KA/LAE
	Questionnaire, Interview & Observation	Peri-urban land holders
	Content Analysis	Documented or descriptive sources
Technical constraints	Observation & Questionnaire	Heads
	Interview, Questionnaire & Observation	Team leaders
	Questionnaire & Interview	Experts
	Content Analysis	Documented or descriptive sources
	Interview, Questionnaire & Observation	Peri-urban land holders
Peri-urban land holders' participation and contributions	Interview, Questionnaire & FGDs	Team leaders and experts
	Questionnaire	Heads
	Content Analysis	Documented or descriptive sources

Table A2. Target Population and Sample Size Determination Table.

No.	Respondents	Target Groups	Target Population	Sample size
	Enzishederiya kebele	Peri-urban land holders	Unknown	404
	Amba_12 kebele	Peri-urban land holders	Unknown	404
		Head	1	1
	Environmental protection land administration and investment office	Team leaders	2	2
		Experts	3	3
		KLAUC	2	2
	Assosa Town Administration land development and management department	Municipality Head	1	1
		Team leader	2	2
		Experts	3	3
	Woreda land development and management office	Head	1	1
		Team leaders	2	2
		Experts	3	3

No.	Respondents	Target Groups	Target Population	Sample size
		KLAUC /KA	2	2
		Total		830

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