



Analyzing actors' interaction behavior in land transactions in informal settlement settings: A case study of Burayu city, Ethiopia

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ABSTRACT

Informality plays an imperative role in offering housing for households in developing countries when the formal market cannot provide enough to keep up with residents' demands. The actors' interaction, with one another, plays an imperative role in land transactions in informal settlement areas. As informal actors operate outside the formal land transactions their activities and methods of operation are rarely understood. Therefore, based on social network theory, this paper aims to identify and examine informal actors, their functions, interactions, and power relationships in informal settlement areas. To this end, this study employed key informant interviews, focus group discussions, structured questionnaires, and a review of published literature, as well as official documents. In the study area, most residents acquired land through informal mechanisms. Major actors include farmers, local land administrators, speculators, land brokers, residents, government officials, and religious leaders. The study also uncovers that the role of each actor varies from information provision to price fixing. Their roles and interactions are governed by dynamic networks and occasionally overlap functions. Among the network actors, land brokers are considered the most influential and powerful because they possess a high degree of centrality, closeness, betweenness, and eigenvector. They hold a pivotal position in the network and act as a liaison between the network's actors. Therefore, the roles of land brokers, who often actively influence the land transaction process, should be considered in urban land governance and incorporated in policy formulation and implementation.

1. Introduction

Informality is recognized as a worldwide phenomenon, commonly related to developing countries [1], and is most clearly uttered in the continued proliferation of informal settlements. Developing countries have more informal settlements and rapid urbanization processes than developed countries [2]. They have failed to fulfil the increasing needs of the inhabitants as a result; informal settlements have developed as an alternative for people and continue to expand. Due to the inefficiency of the legal land supply system, many people in developing countries have most of the land for their housing in informal settlements accessed through informal means [3].

As the formal housing market cannot meet the housing demands of low-income families, informal settlements play an essential role in providing housing opportunities [4]. In the years between 2014 and 2018, the part of the urban population residing in informal

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settlement in the world rose from 23% to 24%, resulting in more than one billion slum residents. Informal residents are most widespread in three regions: East Asia and Southeast Asia (370 million), Sub-Saharan Africa (238 million), and Central and South Asia (226 million) [5]. In African cities, informal housing accounts for 61.7% of urban dwellers; this is representing a significant part of development [4].

The informal expansion of urban areas exceeds formal urbanization in developing countries [6]. The development of informal settlement has been ascribed to the government's failure to establish the environments under which low-income people have formal means of housing and the ineffectiveness of local authorities in enforcing urban development regulations [7]. When there are no reliable formal rules, challenges arise that help to create informal rules that lead to certain behaviors [8]. Moreover, earlier studies have revealed that different forms of social institutions exist that order and support informal settlement growth processes. These forms of social networks/institutions remain unclear due to their complex functioning, dynamics, and numerous actors with changing interests involved in both legal and informal land acquisition practices, concurrently and/or separately or competitively, often leading to disagreements and conflicts [9–11].

Therefore, the processes of informal settlement growth are not only credited to government policy and institutional framework failure, but also the role of actors and their relationships [12]. For instance, the study made in Brazil by Ref. [6] showed that actors continually elude or change formal rules or generate new rules of urban land regulation. In African countries, including Ethiopia, urban land management has been monopolized by state powers [13,14], but enforcement of planning regulations is weak, which means that the influence of individual actors is often high in urban land transactions. Moreover, the number of actors in land transactions is increasing [15]. Actors on the periphery of urban areas of cities, mainly in informal settlement areas, are active in the land transaction process [16]. Informal settlements are the outcome of individual actions, frequently without formal permission [17,18]. However, this is not always the reality, informal settlement growth can also occur with formal actors [7]. Informality occasionally develops within formal government bodies. They are frequently operating as a principal actor in informal settlement growth. They can be buyers, sellers, and informants [3,7]. Moreover [6], stated actors can be intermediaries, developers, and politicians who benefit disproportionately from informal urban expansion and encourage its expansion.

Although various studies have identified different actors and their roles in the land transaction process [16,19], research has not paid enough attention to a full understanding of their interactions and power relationships [20]. Moreover, informal land actors are difficult to identify in a way that is due to their covert nature, unstructured working methods (Network), and the informal nature of their work, which is frequently implicit [21,22]. Furthermore, the land transaction process has become increasingly challenging due to the involvement of many actors with different power relationships in the land transaction [23]. Hence, to guide actors toward practical solutions and enhance land use management operations, it is necessary to clarify actors' power and influence on land transactions [24].

In Ethiopia, despite the long-standing state monopoly on urban land [25], there are an increasing number of actors in the land sector. Previous research has not given sufficient consideration to a comprehensive investigation of power interactions among actors who participate in informal land transactions in Ethiopia [26]. Nowadays, informal land transactions are a basis of livelihood for numerous actors and can therefore be confrontational among them to control the transaction processes and obtain more benefits.

Social networks play a greater function in land transactions among actors in informal settlements. However, actors involved in informal land deals and their social relationships have received scant or inadequate research [7,21,27]. This indicates that identifying individual actors involved in informal land transactions is crucial to understand the system as a whole. Thus, for well-informed policy decisions and well-managed urban growth, it is important to know and identify the actors, their roles, and interactions in informal settlement growth [28]. Moreover, it is vital to comprehend how actors and social networks work in the informal land transactions in informal settlements [29].

In this study, social network analysis (SNA) was utilized to quantify interactions between actors and their structural networks [30]. Numerous studies have highlighted the significance of the social network perspective in understanding power relationships [31–33]. Generally, it allows a deeper understanding of actor positions and the number of connections each actor has, and network-level metrics such as network density [30,34]. A few applications of SNA to informal neighborhood production have been used [35]; however, its use to understand actors' interactions and power relationships in the networks in informal land transactions has not been well documented.

Therefore, this paper aims to identify and examine informal actors, their roles, interactions, and power relationships in informal settlement areas. Based on this study's research objective the following specific three questions were pursued.

1. Who are the major actors in land transactions?
2. What are the roles of each actor in land transactions?
3. Who is/are the most powerful and influential actors in informal land transactions?

This study has made imperative contributions by promoting a comprehensive understanding of actor power and improving one's knowledge of land transactions from an actor's social network perspective. Even though each actor's role is crucial in the land transaction, incorporating the paramount influential actors at the ground level is very important in land governance.

2. Theoretical foundations: informal settlement, actor, and social network theory

2.1. The concept of informal settlement

In the discourse of population growth, informal settlements have emerged as a concept gaining popularity around the world.

Scholars and stakeholders from all fields have been intrigued by this phenomenon, which has sparked conflicting responses about the potential expansion of the urban informal population [36]. The word “informal settlements” encompasses various expressions, including “slums,” “squats,” “shantytowns,” and “spontaneous settlements” [37–39] and spontaneous [40], among many others, making it very challenging to choose just one definition.

The most widely used definition is that informal settlements are built-up areas where residents frequently have no guarantee of tenure for the land or buildings they occupy, and communities typically lack public services and urban infrastructure; housing does not follow development and planning regulations and is often located in geographically and environmentally sensitive areas [4].

In Ethiopia, informal settlements refer to houses built on government or community ownership without legally authorized and building permission [41]. Therefore, the term informal settlement in the Ethiopian setting refers to an area occupied without permission or recognition from the concerned authorities and the building does not align with the general plan of a city [42]. In Ethiopia, they are illegitimate settlements, or typically “moon shine houses” because people squat in the dark night hours on the land [43].

2.2. The actors in informal settlement areas

Actors in the land market are many and complex; they often consist of government workers, private developers, urban land owners, urban residents, and the newcomers to towns or cities [44]. They can demonstrate the capacity to make and perform decisions [45]. The actors in land transactions can be individual or institutional actors, even though it is difficult to separate them [46]. Actors may work in a network with shared aims [47]. This network is affected by the established relationships and power among them.

The power of actors to impact decisions in a network is determined by their resources [48]. Structure power means the power emanating not only from the actors themselves but also from the actors around them [49]. Power denotes the ability of actors to obtain sufficient information and resources to achieve specific results in networks, and may change due to changes in game rules, political decisions, and the dependence of networks on actors. In the informal land process, many steps are undertaken by actors who are involved in the transaction process [50]. The purpose of the actors in informal transactions may be housing, speculation, and development.

2.3. Social network as a key element in actors' relationships in informal land transactions

The concept of social networks has gained prominence as a key model for analyzing and understanding network actors. Social networks give emphasis on analyzing, and comprehending the relationship and network among individuals within the network, unlike the new institution, which focuses on organizational relationships [51]. According to social network theory, informal land transactions are socially constructed through a network of on-going social relations in which actors are included. Compared to the new institutional perspective, social network theory holds that informal land transactions are not only a result of social relationships but also the result of individual rational choices [52]. With regard to social network theory [53] stated that to understand land exchanges among actors, social network theory is applicable.

Therefore, this study adopted social network theory to analyze and understand the relationships and interactions of actors. In the same vein, in Sub-Saharan Africa, social networks are emerging as an essential analytical tool for analyzing urban actors' interactions [54,55].

Social network analysis (SNA) is the procedure of examining social structures using social network theory [56]. It symbolizes network structures in the form of nodes (actors) and the ties (interactions) that link them. In this study, a node refers to an individual informal actor involved in the land transaction, while a tie or link refers to the common aim that connects informal actors.

The interactions between actors in networks are shaped in large part by connectivity. In the context of the land transaction process, connectivity between actors can be denoted by the connections between actors within the networks. The social interactions and connections between actors in land transactions in informal settlements are determined by networks [57]. Moreover [51,58] stated that two or more actors are linked to each other to achieve their land demands by networks as established connections.

Social ties are vital components of a network study. Because actors are linked into connections through creating ties, mainly in informal land transactions [59,60]. The actions of actors in land transactions can be influenced by other actors [60]. In this view, each individual actor's behavior is primarily influenced by the links to which he or she is attached or connected [61,62]. Moreover, the connections between actors can be affected by the resources and power (information) held by the actors in a network [7,63,64].

The actor's position is another crucial element in the network. In the context of a network, actors have positions and these affect the connections between them in land transactions. Within a network, a position is where an actor is located, which can either be weak or strong depending on the existing structure [65,66]. A position can also denote the responsibilities one has in informal or formal land transactions. In informal land transactions, the positions of actors frequently change because of fluctuating land demands.

Generally, informal land transactions are the outcome of the exchange and use of information about the land. Therefore, connections among actors are a significant aspect for consideration as access to land relies on social networks to get information, commission sharing, and witnessing.

3. Research methodology

3.1. Description of the study area

Burayu City is located along the Addis Ababa-Ambo road, 15 km away from Piassa, which is the center of Addis Ababa. Approximately, the city extends from 9°01'00" to 9°06'00" N latitude and 38°36'00" to 38°42'00" E longitudes. In administrative terms, the city belongs to the Oromia Special Zone bordering Addis Ababa City.

Burayu is one of the major and rapidly developing cities in Ethiopia, both demographically and spatially. The inhabitants of Burayu City, comprising informal settlers in the peri-urban areas, were 280,000 in 2017, and the population growth rate was 15.5% annually [67], but currently, the population size is estimated at 400,000 by the city finance and development office in 2022. Additionally, it is anticipated that the city's rate of spatial development will outpace its rate of population growth. Similar to other Ethiopian cities, Burayu is growing quickly and is bounded by the agricultural neighborhood land use, which is characterized by competing, and contradictory needs in land for agriculture, urban economies, and people's settlement.

Land use in Burayu city is changing dramatically from agricultural fields to urban settlements due to fast urban population growth and the associated demand for land for housing and other reasons. Farmers and other actors divide agricultural land illegally into small parcels on a daily basis.

City informal settlements are largely emerging and growing. The study by Ref. [68] indicated that more than 54% of the houses were recognized as informal. These houses were built on land owned by farmers and the state, with no formal requirements or processes. These houses were also not acknowledged by the city land office as legal properties. A large number of informal houses are located in the Gefersa Burayu, Melka Gefersa, Gefersa Nono, and Gefersa Guje, as shown in Fig. 1. The current master plan of Burayu city encompasses six kebele¹ namely Leku Keta, Burayu Keta, Burayu Gefersa, Melka Gefersa, Gefersa Nono, and Gefersa Guje.

3.2. Research design, data sources and methods

This study used a case study research design because to identify the actors, their roles and determine the most powerful and influential actors in informal land transactions are complex and dynamic, which requires a detailed understanding of the local context and an in-depth explanation and interpretation of a phenomenon under study [69]. Therefore, it should be analyzed in its real context. With the help of a case-study method, researchers used mixed methods that enabled us to collect multiple data sources such as documents, interviews and focus group discussion [70,71]. Qualitative and quantitative data were collected concurrently because the data were cross-sectional and both types of data were required at the same time to answer the research questions [72].

The data came from both primary and secondary sources. This enabled the researchers as this data sources complement each to build a convincing argument [73]. Data was collected quantitatively through a questionnaire survey and qualitatively through key informant interviews and focus group discussions.

Closed questionnaires survey are a data collection instrument used for collecting statistical information about the attributes like perception, attitude, experience, or actions of respondents through a set of structured questions [74]. A closed-ended questionnaire survey was conducted to collect data from informal households to understand the means of land acquisition, the source of information about land sales, the actors who facilitate and negotiate land transactions, the bargaining power among actors, and those who fix the price of informal land transactions. A closed-structured questionnaire comprising fixed-response questions was utilized to gather data through on-site by questioning the respondents in face to face interviews. The completion of the questionnaire survey lasted between 7 and 10 min on average.

Open-ended questions were prepared for the Key informant interviews to collect data as they enable the respondents to answer freedom to answers in their own words, it also provides detailed information from the viewpoint of the respondent without major restrictions. KII provided an opportunity to obtain information that might have been omitted from the questionnaire survey. The key informant interview aimed to gather data on the means of legal land transfers, the nature of informal land transactions, the types of actors, their roles and means of interaction, power relations, and institutions that help them in informal land transactions.

Key informant interviews were undertaken with two senior officials and twelve experts from the land use administration. An urban planner, land manager, and legal expert with more than five years of experience were involved in the data provision. Additionally, key informant interviews were conducted with three land speculators, two land brokers, and eight informal households. The duration of the interviews varied significantly from interview to interview, depending on their work, position, and function. But on average, it took between 30 and 35 min.

After actors were identified by KII and FGD for analysis, actors were requested to list the actors they liaised with their corresponding networks. In particular, the actors were requested to consider three altered types of actor ties: (a) information sharing (b) Finance/commission sharing; and, (c) Witnessing. Information sharing refers to actors' ties regarding the exchange of informal land transactions (location, prices, and informal documents). Finance/commission means that actors who participate in an informal land transaction and provide information about the parcel of land will receive commissions (2%) from land sellers. Witnessing means that the actors involved in the witness should put his/her signature/s on the agreement document to approve the land transaction and its correctness.

¹ Kebele represents the lowest level of administrative unit in Ethiopia.

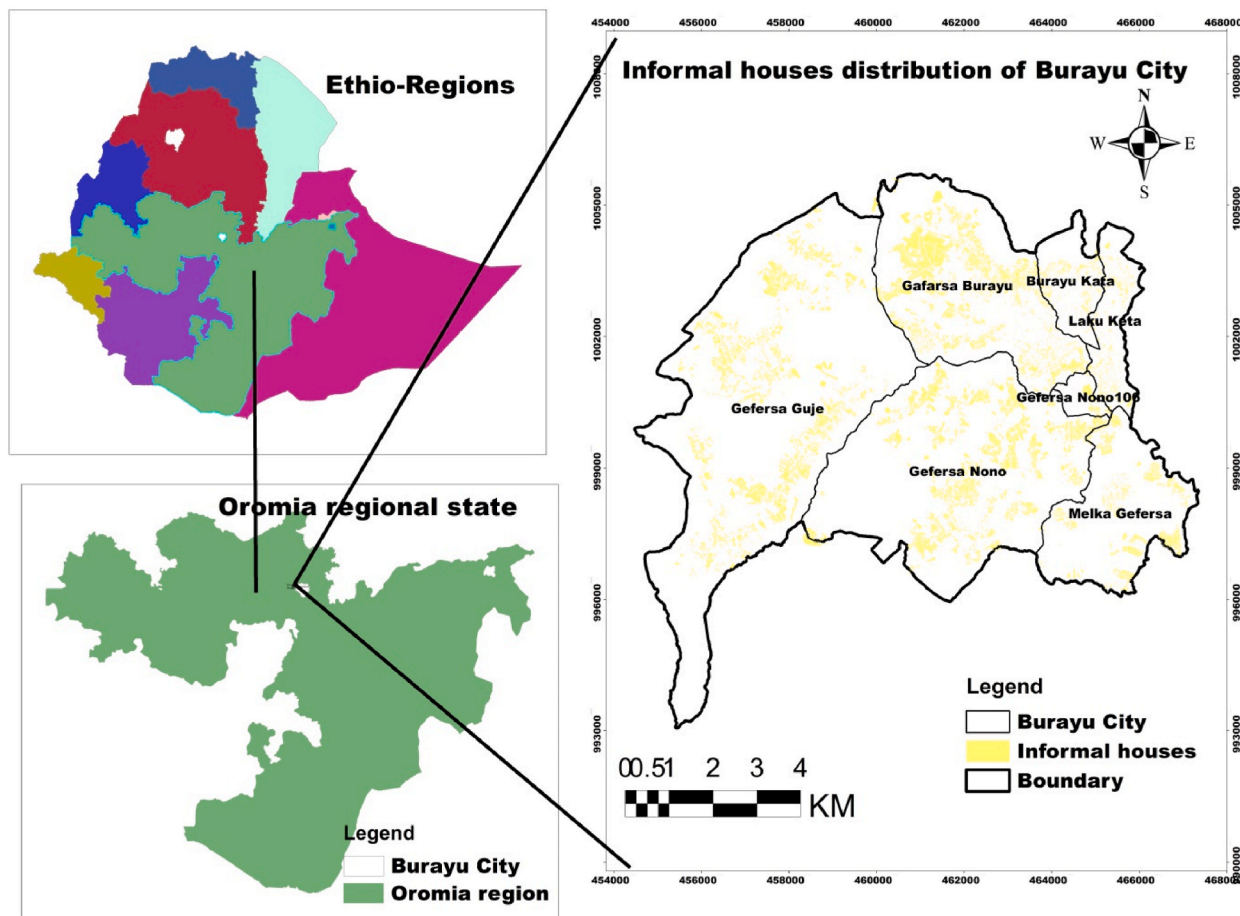


Fig. 1. Informal houses distribution of Burayu city.

Informal actors (farmers, residents, land administrators, speculators, land brokers, private, and real-estate developers and religious institution leaders) were asked to identify their interactions among themselves. Social network analysis requires data about who is connected to whom. The collected data allowed for forming a matrix that connects actors among themselves during informal land transactions (1, 2, and 3 for the presence of connection, and 0 for the absence of connection). The study chose to produce data on three different actors' connections. Presenting the tie contents relation for the actors to mark their relationships based on: 1. information sharing 2. Finance/commission sharing 3. Witnessing. In the case of multiple responses from different actors representing the same responses, the highest score was selected with the assumption that information flows equally among the actors, as long as the actors are actively involved in informal land transaction.

Additionally, two FGDs were conducted with experts and land brokers in the city administration, each with seven participants. Data collected by the FGD includes the roles, interactions, and power relationships between actors involved in an informal land transaction. The implementation of FGDs with these groups triangulated the answers given in the questionnaire. Moreover, this method has generated an opportunity to capture themes that individual respondents may have miss interpreted or overlooked during data collection. A voice recorder was used to record both the KIIs and the FGDs, by asking for respondents' consent and later transcribed to draw patterns along thematic areas. To collect detailed data the FGD participants included have lived for at least five years. The FGDs held with land use experts and land brokers lasted for 40 and 35 min respectively.

Data were collected from September 30th to November 30th, 2022. The entire research questions were developed in English but translated into Afan Oromo or Amharic (local language) versions for better understanding by research participants. Qualitative data were collected by the corresponding author. On the contrary, the quantitative data were collected by seven data collectors who have experience in social science fieldwork. They filled out the survey questionnaires in informal settlement areas by interrogating and filling each question based on the informed agreement of each respondent. Therefore, this study took over the direct door-stepping questionnaire survey administration.

3.3. Sampling methods and sample size determination

A three multi-stage sampling method was utilized for a questionnaire survey. In the initial phase, the four kebele(Gefersa Burayu,

Gefersa Melka, Gefersa Nono, and Gefersa Guje) were chosen by purposive sampling method from six kebele based on the frequency and practice of informal settlements. The second phase involved the purposive selection of informal settlement areas through a preliminary field appraisal with experts from the city land use administration. Accordingly, 17 areas; Magalitu, Kilo 25, Sarti, Silki, Tolcha, Sora Hamba, Tabela 1st and 2nd, Melka 1st, and 2nd, Ane Dima, Hidha Bishan, 105, Lole, Teche, Sangota and Kusaye 1st were purposively selected for the study with reference to the size of informal settlements. Besides, these areas are peri-urban areas where many informal dwellings predominate.

The third and final phase consists of conducting a simple random sampling of informal households from the selected areas. The sample size of the study population was determined after the four study kebeles' were identified. The total number of informal households, in the city was 42,171, of which, only 27,875 were registered as informal settlers. But from this, 16,636 informal houses were demolished. Therefore, the study population was 11,239 informal households, as indicated by the city's urban land use administration. In order to ensure each informal settler had an equal opportunity to be selected for the study, a simple random sampling technique was applied ...

[75] The sample size determination method was utilized to compute the sample size of the households for the analysis because this formula enables us to obtain a representative sample of the population with the desired level of precision. The responses of the respondents were used to study the events or levels of concurrency with the issues raised for them based on the provided scale measurements.

$$n = \frac{N}{1 + \frac{N(e^2)}{1}} \quad N \text{ is the population size, } 1 \text{ is constant}$$

e is the level of precision of the sampling error margin, which is $\pm 5\%$

$$1 = \text{constant } n = \frac{N}{1 + \frac{N(e^2)}{1}} = \frac{11239}{1 + \frac{11239(0.05^2)}{1}} = 386$$

Therefore, the total sample households selected for this study were 386. Then this number was proportionately distributed among the four kebeles based on their population size. A proportion of the sample size was also calculated for each kebele. Thus Gefersa Burayu (85), Gefersa Guje (171), Gefersa Nono (10), and Melka Gefersa (120).

Respondents for KII were chosen using snowballing sampling except officials who are selected by a purposive sampling technique. But with other actors, the adjustment of key informants were conducted with other Key informants based on adequate local information from preceding key informants, so this study, applied the snowball selection technique. In snowball sampling, participants were shown the list of actors and asked to name other actors who, from their point of view, should be involved in informal land transactions and should be known by local residents. Generally, the informants were chosen based on their length of residency in the city (at least live for five), with the assumption that the longer they have lived there, the more they will identify the issues. Although informal settlers are illegal, they enjoy greater social acceptance. As a result, they had no problem identifying themselves as informal settlers. The detailed number of sampled respondents involved in the study is shown in Table 1.

Secondary data sources include peer-reviewed articles, reports (city land demand for housing & land transferred through lease as of 2016), books, legal and policy documents, and proclamations like the FDRE constitution, land lease proclamation and regulation, city structural plan (2014) and land use regulation. These legal and policy documents were used to better understand institutional, legal frameworks for land transactions and to see how they were manipulated by informal actors.

3.4. Ethical approval

Researchers are responsible for respecting the subject's dignity, privacy, and life in their research [76]. Thus, the informed consent of the research participants is the basis for the research-ethnic procedure [77]. With this principle, the researchers followed the 2019 legislation of the Senate of Addis Ababa University, which mentions codes of professional ethics, the rules, and procedures of research standards, norms, and responsibilities. In accordance with this legislation, each respective college or institute expects to establish an ethnic committee that approves the ethics of the research process. In this context, the Ethiopian Institute of Architecture, Building Construction, and Urban Development (EiABC) under its Directorate for Research and Technology Transfer is expected to do this.

However, the directorate has yet to form ethics committee for the research and has insisted that research affecting human insight include a statement of informed consent in its methodological parts. Therefore, it is unlikely to provide the name of the approving ethics committee.

Table 1
Groups and number of sampled participants.

Groups	Sample size
Informal settler household (survey questionnaire)	386
Government officials (KII)	2
Land speculators (KII)	2
Land brokers (KII)	2
Experts (KII)	12
Local residents (KII)	2
Farmers (KII)	2
Private sector and real estate developers(KII)	2
Religious Institution leaders (KII)	2
FGD experts from land use administration	7
FGD land brokers	7
Total	426

In conducting this study, the researchers paid attentions for the ethical issues in research. All procedures prescribed by the university were carried out. Prior to the fieldwork being conducted, the researchers obtained the letter from the university and submitted to the concerned administrations, and with the approval of the relevant authorities. Prior to the interview, the participants were verbally informed about the type and aim of the study to ensure the confidentiality and anonymity of all persons involved. The researchers guaranteed respondents that their information would be used only for educational research purposes. Confidentiality was also upheld in reporting the information. Therefore, all study participants provided their free and informed permission.

3.5. Method of data analysis

The identified actors and their roles in the informal land transaction were analyzed using both qualitative and quantitative analysis. These quantitative data were presented with a pie chart. The qualitative data were also analyzed and interpreted in descriptive, explanatory texts, and narration. The quantitative data were analyzed using Excel to make the analysis and interpretation easy.

While the relationships and interactions among actors were analyzed by social network analysis. SNA helps to understand the role of individual actors and the connections between actors in the context of a broader network of relationships. Social network analysis (SNA) views social relationships as networks of nodes and the linkages that characterize their connections [78]. The nodes in this study refer to the informal actors within the networks, whereas links are interactions that connect the actors (information and resource sharing between the actors).

SNA provides insight into the significance actors in the network [79]. Examining the centrality and network flow can help to comprehend the significance of actors in the network [80]. SNA describes the position of actors in the network by considering the degree of centrality, betweenness, closeness, and eigenvector.

Network matrix was made using information obtained from the interviews using Microsoft Excel. These matrices were then imported into the UCINET social network software (version 6.759) to generate informal network maps by Net Draw. In order to determine the levels of interaction in the network, descriptive network statistics were created in addition to visual and quantitative analysis.

The connection matrix was loaded into UCINET 6.759 Software to construct the sociograms establishing the linkages between actors (Fig. 2) and to analyze the structure of networks through centrality scores. For actor interaction, UCINET 6.759 Software is permitted to calculate the following scores: degree, eigenvector, closeness, and betweenness [81].

4. Results and discussion

4.1. Major actors and their role in land transaction informal settlement area

In Ethiopia, and particularly in Burayu, formal urban land is acquired from peri-urban farmers through the redistribution of land to private developers and others by leasing through tenders and allotments [82]. The allotment and tender remained the most active technique for municipalities' income generation and were used as the main strategy for transferring land to developers. But the allotment and tender strategy failed to provide land demand for housing construction for residents. This turns the inhabitants to be involved in informal land acquisition. For example in the study areas, the actors employed various methods to get plots of land from the land market. A large number of households are acquiring land through the informal land transaction mechanism in informal settlement settings as shown in Table 2. With regard to informal land transaction [83]) stated that in Africa, like the global south, demand for urban land has exceeded supply, resulting in the development of informal land transactions which is leading to the expansion of urban informal settlements, especially in peri-urban areas.

In Ethiopia, as in many other parts of East African countries where the formal land delivery system is still weak, informal land transaction actors play a larger role [26]. These actors include individuals, local committees (Gatekeepers), brokers, and administrative authorities who are assuming roles in land administration that are outside their responsibilities. But in the study area, respondents who have been involved in KII and FGD pointed out that local land administrators, residents, land brokers, speculators, real estate developers, and religious institution leaders are actors who have been involved in informal land transaction activities.

Those informal actors change or modify legally enforceable regulations to fit their own benefits. Concerning actors behaviour in land transaction [6] stated that actors are continually elude or change formal rules or generate new rules of urban land regulation. These informal actors perform various functions, including information sharing, encouraging land transactions, and enabling informal title registration procedures, which can lead to land disputes when a parcel of property is transferred to multiple parties. They also engage in land development and construction activities that are not governed by the law, as well as in informal land acquisition and dispute resolution. These informal actors are presented in Fig. 2.

4.1.1. Local land administrators

Local land administrators are these groups including both local politicians and professionals. In the study area, the local government performs several responsibilities in urban land use administration, including land suppliers, policy regulators, administrators, and land-use managers, as well as setting criteria and parameters for local planners, managers, authorities, and other actors to follow. This implies that the government has established a formal institution for land management actors to follow the established rules and regulations.

This function of the government is congruent with the description of an institution given by Ref. [84] as a set of rules created by humans to regulate social and political relations. In Ethiopia, the existing land policy of the country states that land belongs to the state and the people [25]. This implies that the government acts as the caretaker of the land and the most powerful actor in the market, and

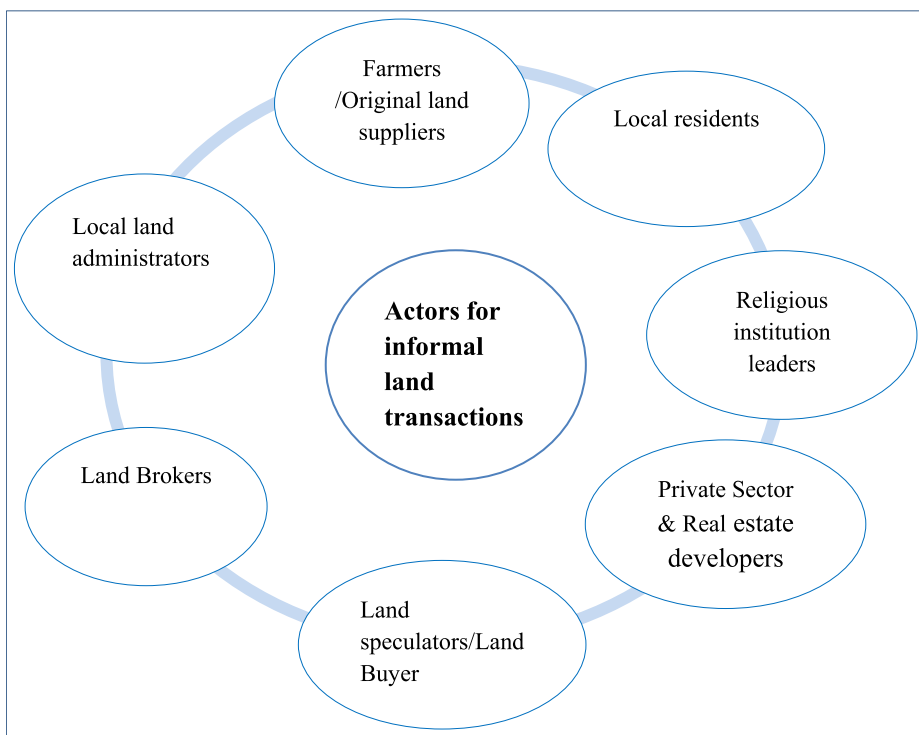


Fig. 2. Key actors in informal land transactions.

Table 2
Means of land acquisition in Burayu informal settlement areas.

Means of land acquisitions	Frequency	Per cent
Bought from farmer	164	42.5
Bought from land speculators	116	30.1
Occupying government land	83	21.5
Inheritance	17	4.4
Government allocation	6	1.6
Total	386	100.0

is also the sole provider of land for urban growth, using expropriation as the sole means of acquiring land. As a result, government administrative decisions can encourage or obstruct successful relationships between other actors.

But in contrast to the role and responsibility given to local authority in the study area, some land managers were identified as key actors in the informal land allocation and transaction in informal settlement areas by providing surveying, information about land conditions, and giving promising that the land would be regularized as soon as possible. People who acquire land in informal settlements obtain regular tenure by establishing strong relationships with local authorities after they settle in. Then, the officials give legal title to the individual who built a house on informal acquainted land. An interviewee, who has got legal title, confirmed that *everybody that has money can get the legal tile on the land that has acquainted informally, for example, I pay 4279.02US\$² a broker who deals with land offices about formalizing and I get my legal title without going to the office.*

Moreover, under the Kebele administration, there are also people from the Zone who were assigned as gatekeepers. Those gatekeepers are a group of personnel collected from different Zone offices by the kebele administration to keep an eye on illegal land occupation, construction, and in neighborhood sanitation. The gatekeepers’ legal tasks are to control informal land subdivisions and unauthorized buildings and take various actions, ranging from warnings to demolition. This group is in charge of demolishing houses constructed after 2010. However, the group has no way of identifying illegal land occupations after 2010; therefore, no effective and consistent steps to manage the occupancy have been taken.

In contrast, the duties given to them data from informal settlers indicated that the function of gatekeepers in facilitating informal settlement expansion is also great. The gatekeepers are not experts, but they are experienced in the processes of informal land

² 1US\$ = 32.7178 Birr in February 2020. Birr is the unit of currency in Ethiopia.

subdivisions and unauthorized development. The interviews made with experts in the land use administration also show that gatekeepers play key functions in informal land subdivisions both indirectly and directly.

After an informal occupation, construction is carried out according to an arrangement made between the informal settlers and the gatekeepers. The informal settlers pay up to 1833.86 US\$ to the gatekeepers, and informal settlers are advised to do the construction work at a specific time. The gatekeepers are also essential sources of information regarding the condition of plots and their intended use in the future. These gatekeepers are sometimes called double agents as they work both for the government and informal actors. The role of gatekeepers identified in this study is similar to the finding of [85].

4.1.2. Farmers/original land suppliers

Farmers/Original land suppliers is household who are the original landowners and living in the city or peri-urban areas whose livelihood predominantly depend on agriculture. Farmers are not only the main providers/sellers of land for the informal market, but also engage in the informal land division and building of poor residential houses on agricultural land without permits. The building of informal houses on agricultural land by farmers is motivated in part by an aspiration to make more cash by renting housings, and partly by a desire to benefit from potential urban property value increases. Local farmers also act as sub-brokers, providing information to the key brokers. According to the results of the survey questionnaire, most of the information about the land for sale is available directly from the farmers (Fig. 3).

Local farmers have low bargaining power in the informal land transaction. According to the survey questionnaire, 75% of the farmers asked and were led by land brokers before selling their land, demonstrating their reliance on these actors. Farmers have little say in setting prices as they lack adequate information about prices. Moreover, the farmers' responses to the issue of who determined the price when they sold their land show that 70% of them sold their land grounded on the price set by brokers. The farmers have also claimed that brokers and buyers have treated them unfairly due to their lack of power. This finding is consistent with [86,87] findings, which claim that farmers with little knowledge and financial resources are being exploited by other actors in this era of fast urbanization.

4.1.3. Local residents

A local resident means residents of the city who acquired land through formal or informal ways and engaged in non-agriculture activities. Local residents/non farmers also have a role in land transactions in informal settlement areas. They act as land sellers, buyers (speculators), brokers, and witnessing. They divide their land into smaller pieces when they needed cash. A participant, who held a huge plot of land, confirmed that *I was fortunate in that I bought a large parcel of land at a period while the land was inexpensive. I have recently begun parceling this land and selling it to raise money for constructing my dream home. Potential purchasers have been sent to me by local authorities and certain brokers.*

Fig. 3 shows that information about the availability of the land can be provided by the local residents to the land buyers. Moreover, the local residents are also doing preliminary negotiations with the sellers. Even though a great number of the negotiations are accomplished directly between seller and buyer during the land transaction, as shown in Fig. 4, local residents and brokers also facilitated the transaction and were responsible for preparing a letter of the contract agreement for sale.

Mostly, residents are perceived as passive actors as they did not have their own land or secured their plots [20]. But in the study area, as indicated by key informants, they are active actors in informal land division and provision of information for new arrivals who want to buy land. Moreover, they also connect the new arrival with the broker and participate in the signing of land transactions documents as witnesses between sellers and buyers during the informal contract agreement. Because of trust, they can play an important role between sellers and buyers. According to Ref. [88] local resident participation is critical in avoiding possible land-use disputes in their immediate vicinity.

The local residents also play broker roles. But they are different from brokers, as they take a small amount of commission for services offered in land transactions even in some cases they offer free information and witnessing to people who are their relatives and close them. The functions of local residents also portray the idea of betweenness, whereby their actions influence other actors during land transaction decisions.

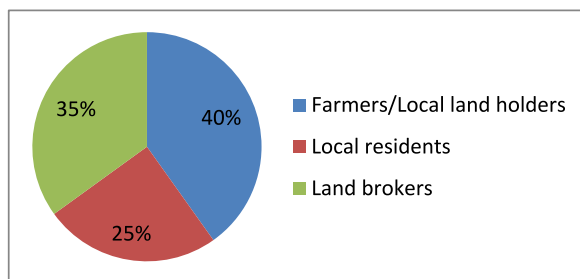


Fig. 3. Major sources of information for plot sale.

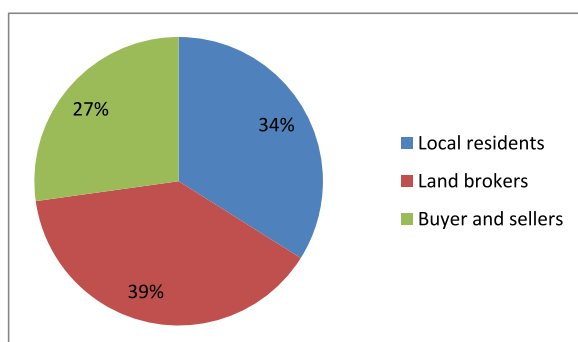


Fig. 4. Actors who facilitated and negotiated land transaction.

4.1.4. Private sectors and real estate developers

Private Sector and Real estate developers refer to these actors who legally register for housing provision and demand land for commercial and industrial purposes in exchange for financial support from the government. These actors need land for industrial and commercial objectives. They are mostly concerned with profiting from the land. Both local and federal administrations, especially the Burayu city administration, strongly encouraged these actors to acquire land and establish enterprises. Because of Burayu city's strategic location and development potential, this group demands land from informal settlement areas.

Private sector actors participate in both informal and formal land transaction processes as land users. Registered private enterprises, such as investors and land service providers, make up the formal private sector [89,90]. They are interested in land development for profit gain. However, key interview results indicate that parts of their actions are informal, as they include unoccupied government land in their built-up area. In order to gain access to land-related data, they interact with relevant government agencies and individual landowners. They also worked collaboratively with land brokers.

4.1.5. Land brokers

Land brokers refer to those people who are residents or non-residents of the city involved in general brokerage services but predominantly engaged in land transactions to earn a 2% commission from each plot sale of land. They are also well known by city residents. In Ethiopia land brokers are called *delalas*, are individuals who are operating as intermediaries between the sellers and buyers [91]. The results of an interview and focus group with city-based land brokers and experts in land administration show that the function of land brokers as information sources in informal markets is more important than what sample questionnaire respondents indicated (see Fig. 3). Land brokers are the major information disseminator about plot availability. After getting information, they spread it by talking to everyone they meet. This indicates that in the city, land brokers can know about the availability of plots for sale through various social interactions.

The broker also decided on the price of the land by considering the price of the neighboring land recently sold by another person. They made agreements with land sellers to sell at a certain fixed price, but they sold the same land at a higher price to the buyer to take the difference. They fix prices grounded on two issues. The first type of pricing is done by expecting a 2% commission from each of the two parts. The second type of pricing is known as 'Irratti qabachuu' Afan Oromo word which designates an act of receiving an inappropriate benefit over the purchaser without his/her knowledge. The broker earns extra money from this type of pricing by adding a price above what the seller sets.

As a result, land brokers stand to benefit the most from informal land development and land transactions. Typically, brokers obtain plot information from the seller through their information networks. Because information is so important in this business, there are sub-brokers who provide data to the key brokers. A sub-broker is someone who knows someone who is selling their land. Their activity is not limited to connecting buyers and sellers in informal land transactions, but they are also involved in land speculation and sometimes, they also have a responsibility to participate in price negotiations and find prices that meet the buyers' needs [7].

The data collected from informal settlers through the interview show that currently the one who participated as the land broker could be accumulated capital within a short period. As a consequence, many individuals who had permanently worked were also engaged in informal land transactions as land brokers. The interviewee said that without land brokers, the land transaction could not be successful. This is because the brokers have the capability to lobby the buyer, and seller and close linkage with Kebele administrators and land officials.

As highlighted by interviewed land brokers in the study area, they have a diverse social network by which they can obtain land information. Even, officials from the land use administration office are said to be part of this network. This is consistent with other studies finding that social networks were important in allowing land seekers with informal access to land [92].

Land brokers had full knowledge of land-related issues in the study areas. They are well-informed about the gaps in the rules. For example, in Ethiopia, land sales are illegal. However, in the informal settlement areas, land transactions through unlawful sales are frequent, as are fraudulent gift and donation schemes. They play a substantial role in the facilitation of fraudulent land transactions and agreements.

They also have strong links with local residents, local authorities, and village representatives. As a result, they are quite familiar

with the local inhabitant and have extensive local knowledge of land-related matters such as the individual features of landholders, plot values, parcel location, and direction, and legal issues. This finding confirmed the study conducted by Ref. [89]. Moreover, data from the questionnaire survey indicated a large percentage of land transactions are facilitated and negotiated by land brokers. As shown in Fig. 4, large numbers of buyers have used land brokers for transaction facilitation and negotiation. Therefore, land brokers have the duty to enable the transaction and negotiation as quickly as possible by arranging contract agreement documents.

4.1.6. Land speculators/land buyer

Speculators are those people who are involved in land subdivision and acquire land for housing through the informal land transaction for speculative purpose. Land buyers have varying land requirements depending on their financial situation and activities, such as construction or speculation [20]. Data obtained from key informal interviews indicate that some purchasers resell their land without adding any value to the land aiming to earn more money. Moreover, the questionnaire survey results indicated that 30% of the respondents purchased land from sellers who had previously purchased it landholders. Some of the land speculators had bought land with the intention of living there, but were forced to sell it due to a life crisis such as loss of employment; even some may be due to divorce.

The inhabitants who have participated in resale indicate that the motives for land speculation play a greater role in an informal land transaction. These sellers buy numerous plots at a low price and hold them until it appreciates. This finding aligns with [93] who stated that land speculators are the major actors in the land informal transaction in peri-urban areas in Shashemene town.

4.1.7. Religious institution/leaders

Religious institutions refer to religious organizations used for worship and related religious, charitable, or social activities which churches and mosques. One of the actors who participated in the informal settlement expansion in the study area is a religious institution that includes Orthodox churches, Protestant churches, and Muslim Mosques. Even though, the land lease proclamation states that these institutions should get land through the allotment method, due to easy access and their bargaining power to reverse their informality they do not want to go through formal land acquisition as pointed out by the city administration.

Interviews made with experts in the city land administration revealed that even though their numbers are insignificant the number of religious institutions who are occupying both government land and buying land informally from farmers is increasing since 2015. The numbers of religious institutions built informally in the years between 2015 and 2021 were eight. Although their numbers are small they occupied a large plot of land. For example, Orthodox and Protestant churches occupied huge plots of government land in the FiliDoro area. Moreover, these religious institutions also occupy land informally in the Ashawa Meda and Gabriel areas.

Furthermore, the experts added that the religious leaders have a strong relationship with land brokers to get land and with some experts from land use administration to have legal titles informal. This finding also aligns with research conducted by Ref. [94], which

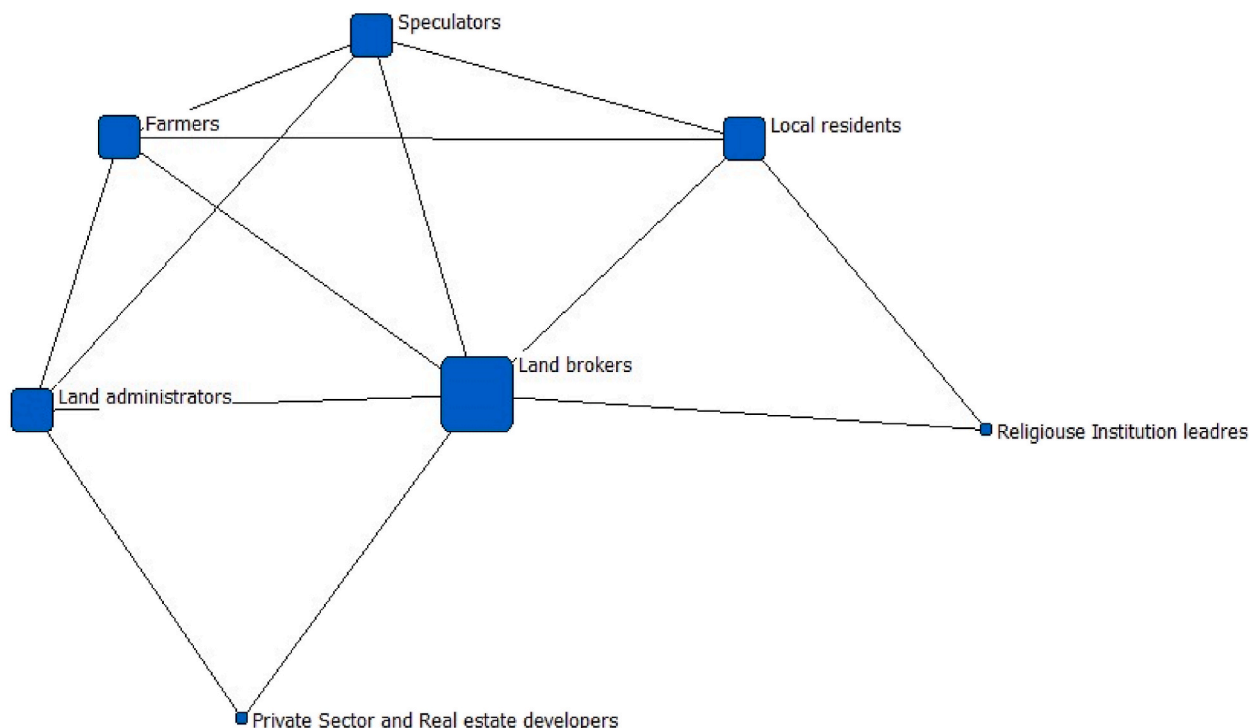


Fig. 5. Graph of the whole social network.

confirms that social services like religious institutions have helped the growth of the informal settlements in Sebeta town.

In relation to the above discussion [95] stated that the roles of the actors in the informal land transaction are various and frequently changing. This makes land transaction decision-making, a complex and ever-changing process. As a result, informal land governance relies on connections and power relationships among actors who play various responsibilities [96,97]. Moreover [13], stated that certain actors may be excluded or included, deliberately or unknowingly, due to disparities in the sharing of power. Moreover, with regard to actors' roles in the above discussion, numerous actors have participated in informal land transactions in the informal settlement area, and some of these actors play multiple roles, and their roles can complement or supplement one another. These roles are influenced by authority and power [96,98]. Therefore, their contribution to informal settlement growth varies due to their power relationship. This impacts power relations and interactions among actors presented in the following section.

4.2. Actor interaction and power relations in land transactions in the informal settlement area

Understanding the degree to which each actor in the informal land market influences the other is a critical subject that should be thoroughly investigated [99]. Informal land transactions in the informal settlement areas can be facilitated by structural characteristics at the level of whole networks and characteristics at the level of individual actors. Therefore, the following discussion focuses on both network levels.

4.2.1. Network size and visualization between the informal actors

Fig. 5 illustrates the relational network of informal actors during the informal land transaction. The magnitude of the nodes is affected by the overall degree, which means that larger nodes occupy a more central position in the network. The whole number of ties in the network was 26. As observed from Fig. 5, private sector and real estate developers and religious institution leaders have a small size and are isolated because their network and involvement are not continuous like other actors within the network.

4.2.2. Network density of the informal actors

Network density refers to the totality of the ties an actor has with other actors in the network divided by the number of possible ties. It shows whether the entire actors in networks are accessible by all others [100]. The density for informal actors in this study was found to be 0.619.

The density's value ranges from 0 to 1, where 1 denotes the presence of potential relationships and 0 corresponds with no relationships. The process of information flow is more likely to occur in dense networks than in sparse networks [101]. In this study, the informal actors' network has a high density, which shows the easy flow of information between the informal actors to transact land.

4.2.3. Informal actors network position and their influence on informal land transaction

Assessing structural features of actors at individual level helps to comprehend how actors can use their structural position to impact the land transaction practice [79]. Thus, the position of the actors in a networks can be calculated by their relationship within the network [79]. The central position of actors can be understood from the centrality values which are depicted in Table 3.

Table 3 depicts that the land brokers has a high centrality value. Moreover, land brokers occupy a central position in a social network (Fig. 5), and can exert influence on others in the networks, as they are located at the central network which aids them to access information which can set them at a benefit [102,103].

There are four common means to quantify centrality in social network analysis. Centrality measures the degree to which one actor interacts with others who are not otherwise connected [104]. SNA is employed to quantify the extent to which the actors indirectly or directly connect with other actors [105].

4.2.4. Degree of centrality

Degree centrality evaluates how imperative a node is grounded on the numbers of ties each node has in the network and the higher the central degree means, more powerful the nodes are [106]. From Table 3, land brokers have the highest degree because six informal actors are connected to them. Therefore, accordingly, land brokers have the most linked actors who are likely to grip more information which enables them to link with the broader network rapidly. Regarding centrality [107], found that actors with a high degree of centrality are those who interact quickly and easily with other actors because they tend to have shorter lines of communication. They added that actors who have manifold links have great power because they have more information than other actors. Accordingly, land brokers in this study are the actors who have the most ties with other actors and a great influence on informal land transactions.

Table 3
Centrality degree actor network in informal settlement areas.

Informal actors	Degree	Between	Closeness	Eigenvector
Farmers	4	0.34	0.833	0.418
Local residents	4	1	0.833	0.386
Land administrators	4	1	0.833	0.386
Speculators	4	0.34	0.833	0.418
Land brokers	6	5.34	1.000	0.505
Private Sector and Real estate developers	2	0	0.667	0.219
Religious Institution leaders	2	0	0.667	0.219

4.2.5. Betweenness centrality

An actor's betweenness centrality measures how closely it is connected to other actors in the network by the shortest paths [108]. This means, the power of the actors in the networks depends on their ability to establish connections with other actors. Land brokers have 5.34 betweenness centrality degree. This figure indicates that land brokers have emerged as the actors who are playing the most imperative role in governing the course information in the informal land transaction network. A land broker functions as a conduit for information dissemination and liaison within the network. Concerning betweenness centrality [100] stated that these actors who have high in betweenness recognized as a bridge and information agents in a network because they are found on communication paths. Moreover [102], stated that the social network actors with a great betweenness centrality are one who are positioned between numerous other actors. They could act as a bridge between these others otherwise they are disconnected. Having a high betweenness centrality allows actors to influence the flow of resources between each other.

4.2.5.1. Closeness centrality. The closeness centrality measures the distance between each node in network grounded on the shortest paths between them [109]. By analyzing the nodes with the highest closeness centralities, the network closeness centrality was determined. According to Table 3, land brokers' closeness centrality (1.00) is the highest, so these informal actors can influence the entire network quickly.

4.2.6. Eigenvectors

The eigenvector is aim to measure the central actor, which have the shortest path from others actors in the network. The more the value of eigenvector scores means the more central actors in the network, lower value, conversely, shows that actors are located in peripheral in the network [110]. The results showed that out of these informal actors that take part in this study, the land brokers have a strong tie with an eigenvalue of 0.50 (see Table 3) which assisted these actors to form ties with 6 other actors (see Fig. 5). This shows that the land brokers are the most central actor with the shortest distance from other informal actors in the network. In this regard [100], stated that the eigenvector measures how an actor is well-linked and has a position in the network in relation to other actors.

5. Conclusion

In developing countries, most urban housing in urban areas is provided through informal land transactions that are shaped by the complementary roles of actors and power relationships. This study scrutinized the actors, their roles, connections/interactions, and power relationships in informal land transactions in the case of Burayu City with the use of a mixed research approach and the application of tools drawn from social network analysis. The informal land transactions are the major activities in the study area which are shaped by different or complementary roles of actors such as farmers, speculators; land brokers, local residents, private and real estate developers, local land and government officials, and religious institution leaders.

The roles of actors and their connections in informal land transaction processes are dynamic, and the nature of the relationships is not linear. Their roles may occasionally overlap and are not always consistent, and their interactions are temporary. Moreover, one actor's behavior or activity in a network might sometimes have a consequence for other actors. The participation of actors in informal transaction processes showed that the actor's abilities to act and their interaction are influenced by the network they have established. This means that the network they established facilitates their roles and relationships.

The study revealed that there is high network density among the informal actors which indicates that actors are close to one another in the network as a result they have short channels of communication. Another important point that the study revealed is that land brokers were found to have large centrality, betweenness, closeness, and eigenvector values. Thus, land brokers are the main actors performing a significant role in rapid informal land transactions in informal settlements. They have many functions and ties in the network to influence other actors as they have many networks, which enabled them to collect a lot of information related to land transactions. Therefore, they are functioning as a channel for information dissemination and liaison within the network.

The study highlighted the informal actor's behavior in land transactions which is importance for understanding informal actors' inclusion in land governance in policy formulation, monitoring, and appraisal systems at all levels. This will enable the smooth land transaction process in urban land management. Contrary to this finding, in Ethiopia, there has been a lack of incorporating informal actors in the management of the urban land transaction system. This means, even though the influence of informal actors like land brokers, on land transactions is significant they are underestimated in the legal and policy framework of urban management. Understanding land transaction actor interaction networks and their powerful influence is essential to promote common action in effective planning and management of interdependent land management. Therefore, this study contributes to the field of urban planning and management of the urban arena by advancing the empirical understanding of actors' network properties and the underlying mechanisms that govern the creation of ties/links in actor interaction networks. currently in the urban arena due to the prevalence of diverse interests and powers in the urban governance system domain, and the emergence of a new model of decentralization in planning, incorporating the principle of social networking principle in all forms of land governance to bring effective urban development is very important.

The study has some limitations. As this study is confined to the Burayu city case, the study suggests further research should be conducted using SNA to examine a broader scale of the role each actor plays and the power of influence in the informal land transaction at various urban centers in Ethiopia and developing countries. Finally, definition fluidity of actors may occur as some of the land brokers emerge from local residents and farmers which may affect finding. The list of informal actors used for this study may not be exhaustive, which demands another study too.

Author contribution statement

Tefera Beyera Bayuma: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Birhanu Girma Abebe: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Data availability statement

Data included in article/supp. material/referenced in article.

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Declaration of competing interest

The authors declare no competing interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2023.e19515>.

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