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# THE IMPACT OF URBAN LAND USE CHANGES ON RESIDENTIAL PROPERTY VALUES

The Case of Bole Sub City, Addis Ababa

A thesis submitted to the school of graduate studies of Addis Ababa University, Ethiopian Institute of Architecture, Building Construction and City Development (EiABC), in partial fulfilment for Master's degree in Urban Land and Property Valuation.

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This thesis is submitted to Ethiopian Institute of Architecture, Building Construction and City Development (EiABC), Addis Ababa University, in partial fulfilment of the requirements for the degree of Masters of Arts in Urban Land and Property Valuation.

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The Case of Bole Sub City, Addis Ababa

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## DECLARATION

I declare that, this thesis prepared for the partial fulfilment of the requirements for the degree of Masters of Arts in Urban Land and Property Valuation entitled **"The Impact of Urban Land Use Changes on Residential Property Values: The Case of Bole Sub City, Addis Ababa"** is my original work, and it has not been submitted by any other person for an award of a degree in any other university or institutions and that all sources of materials used for the thesis have been dully acknowledged.

**Degualem Mekuriaw Alemu**

Signature ……

## CONFIRMATION

I stated that Degualem Mekuriaw Alemu has carried out this research work on the topic entitled **"The Impact of Urban Land Use Changes on Residential Property Values: The Case of Bole Sub City, Addis Ababa"** under my supervision and it is sufficient for submission for the partial fulfilment for the award of master's degree in Urban Land and Property Valuation.

**Eyasu Kumera**

Signature ……

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"My success is founded on the will of the God".

Degualem M.

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## Abbreviations and Acronyms

| | | |
|---|---|---|
| AACPPO | = | Addis Ababa City Planning Project Office |
| AASP | = | Addis Ababa Structure Plan |
| AMOS | = | Analysis of Moment Structures |
| Birr | = | Ethiopian currency |
| BSCUPO | = | Bole Sub City Urban Planning Office |

CAD = Computer Aided Design

Cap Rate = Capitalization rate

CBE = Commercial Bank of Ethiopia

CSA = Central Statistical Agency

DVI = Depreciated Value of Improvement

E.C = Ethiopian Calendar

EA = Proposed Mixed Use

EGI = Effective Gross Income

EiABC = Ethiopian institute of Architecture Building Construction and City Development

FIG = International Federation of Surveyors

G + 0 = Ground Plus Zero

G + 1 = Ground Plus One

G + 2 = Ground Plus Two

G + 3 = Ground Plus Three

G.C = Gregorian Calendar

GIS = Geographic Information System

IIED = International Institute of Environment and Development

IJSR = International Journal of Science and Research

IVS = International Valuation Standards

IVSC = International Valuation Standards Committee

IVSC = International Valuation Standards Council

JHSS = Journal of Humanities and Social Science

LRT = Light Rail Transit

| | | |
|---|---|---|
| NIC | = | New Improvement Cost |
| NOI | = | Net Operating Income |
| OE | = | Operating Expense |
| ORAAMP | = | Office for the Revision of Addis Ababa Master Plan |
| PGI | = | Potential Gross Income |
| RICS | = | Royal Institution of Chartered Surveyors |
| SC | = | Sub Center |
| SEM | = | Structural Equation Modeling |
| SPSS | = | Statistical Package for Social Science |
| UK | = | United Kingdom |
| UN | = | United Nations |
| UN – ECE | = | United Nations Economic Commission for Europe |
| UNPD | = | United Nations Population Division |
| USA | = | United States of America |
| Vac | = | Vacancies |
| VIF | = | Variance Inflation Factor |
| VL | = | Value of Land |

**Abstract**

*This study investigates the impact of urban land use changes on residential property values. For this, a case study approach was employed by the CMC-Safari area of Bole sub-city, Addis Ababa-Ethiopia. The primary data was gathered from 50 households and real estate brokers practicing in the study area using structured questionnaires, 15 key informants through interviews and observation. Brief survey of literature and different published and unpublished data available at different offices was also part of the information collected using secondary sources. The data collected were analyzed with Relative Importance Index (RII) technique, regression analysis, and simple descriptive analysis, particularly with frequencies and percentages. Also, valuation of affected residential properties was conducted, value changes trend analysis was carried out using appropriate software applications. The findings of this study indicated that the study area has undertaken a significant level of change in land use in the last two decades from farmlands to different urban land uses such as residential, commercial, mixed-use, social service, greenery & open space, administration, and small-scale manufacturing. Based on the RII value, housing demand (0.956), road construction and transport access (0.896), agglomeration of business activities (0.848), utility development (0.832) are identified as the most significant attributes (in their order of importance) for land use change that affected residential property values in the study area. Other important factors discovered include broker's interference, social class influx (high-income groups), an intervention of financial institutions, and real-estate development while public service development was found to be the least influential determinant. The regression analysis result have shown that, 81.7% of the variation in the dependent (single- family residential rental value) variable can be explained by variations in the independent variables (determinants of land use change). It was also found that land use change positively affects residential property values and correspondingly increases its value (both rental and sale) in the study area. The study suggests that there is need to put an efficient scheme to minimize broker's negative role in distorting value determination. There is also a need to emplace a land value capture tax on owners for the benefits gained from public investment (example: - road construction).*

***Keywords:*** *Addis Ababa, Brokers, CMC-Safari area, Impact, Land use change, Residential property values*

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the study

Urbanization is a rural to urban transition involving population, economic activity, culture and changes in land use for areas usually on the periphery (Gordon and David, 2014). It is one of the global concerns and the 20th century is related to the miracle of rapid urbanization. According to FIG Commission 3 (2010), by 1900, 13% of the world population was urbanized. This percent has increased and in 2014, 54% of the world population was urban and it is expected to continue to grow and will reach 66%, by 2050 (United Nations Population Division, 2014). On the other hand, studies show that majority of inhabitants of the less developed regions still live in rural areas while that of more developed regions population is highly urbanized. According to Gordon and David (2014), high urban shares are reached in Europe and North America with, over 70% portions.

According to United Nations Population Division (2014), urbanization is connected to the three pillars of sustainable development: social, economic and environmental. Today, despite the comparative advantages of cities, millions of the world's urban poor live in substandard conditions with inadequate social and physical infrastructures, housing shortage, transportation problems and rapid sprawling. Consequently, United Nation Population Division report indicated that over 70% of the growth currently takes place outside the formal planning process and about 80% of urban populations in developing countries are living in slums. As a result, developing countries will face numerous challenges in meeting the needs of their growing populations including housing, transportation, education and healthcare demands (UN-HABITATE, 2010). Therefore, managing urban areas has become the most important issue of the 21st century.

As a result, the development process of urban areas needed proper and sustainable urban planning. For instance, the history of urban planning in the United States is largely one of the responses to urbanization and the problems it has brought ( Levy, 2017). Urban planning refers to planning with spatial component in which general objective is to provide spatial structure of land uses which are better than the pattern that would exist without planning (Peter, 2002). It is concerned with shaping our living environment where the place we live, work and interact (Xinhao and Rainer, 2007). It has different components which are interrelated to each other includes social, economic, and physical i.e. land use, road, and housing (Berke et al., 2006; Jordan, 2012). The land use components of an urban plan are considered the most important part of a plan because it indicates

everything that makes up a city, different uses, and activities on the land (Jordan, 2012). The land is the ultimate resource and life on the earth cannot be sustained without it. Hence, good stewardship of the land is essential for present and future generation (UN-ECE, 1996). Thus, this scarce resource should be properly planned. Urban land use plan is a key tool to coordinate community land use and development activities (Berke et al., 2006) as well as to shape the urban development pattern ( Levy, 2017). It also shows the community's future land use development used for different purpose includes residential, commercial, industrial etc. Also indicates the way to be how cities use its land by putting everything in a good place in order to resolve conflicts between different types of uses (Jordan, 2012). According to Jordan (2012), it is the making of room for people, buildings, roads, and all other things that make up a city based on the relationship between the demand for future land use and the supply of the land available for development.

Land use system is dynamic, uses expand and contract, persist and change in response to population and economic growth, public and private decision, market and governmental actions; because of different interests on land computing for land use change (Berke et al., 2006). Urban land use change is a complex phenomenon differing greatly from place to place (Abera and Mehari, 2017). It can be defined as the changing of the activities of the land from one type of use to another i.e. from farmlands into different urban activities such as residential, commercial, and other urban services. According to Berke et al. (2006), for metropolitan areas with high projected population growth and uncertain development dynamics, the task is more challenging since the drivers of land use changes are more complex interrelated and unpredictable. From the planner's perspective Berke et al. (2006), identified three major interests influencing land use change in order to establish a future land use patterns that meet the community needs. These are, (1) developer's response to real estate market demand: they propose projects that respond to market demand and search vacant or underutilized lands that offer a potential for development. (2) Government plans, policies, and regulations aimed at managing community development: i.e. zoning and subdivision laws. (3) Community values and interests directed towards maintaining and improving the quality of life. Example, construction of access roads in the neighborhood.

Therefore, land use changes pressured by different factors affected the demand and supply of land and properties. Because land use change leads to property formation on land. The word property has many dimensions; in a legal sense, property describes the relationship between people and things that the right of a person to possess, use/own things (Daniel and Melkamu, 2008). Properties

may be personal or real. Personal property refers to everything else, items which are movable and not a part of the land (Appraisal Institute, 2013). Real property is generally referred to as rights in reality. Although in some jurisdictions real estate and real property are used synonymously. But there is an important distinction between the two. Real property means all rights, interests, and benefits related to the ownership of the physical real estate (Royal Institution of Chartered Surveyors (RICS), 2012; Appraisal Institute, 2013). Whereas, real estate means actual tangible property both land and all items that are a natural part of the land e.g. trees, minerals and that have been attached to the land such as buildings, site improvements (Royal Institution of Chartered Surveyors (RICS), 2012; Appraisal Institute, 2013). However, the term property used in this study is meant for real property. Michigan State Tax Commission (2013), grouped real properties into the following classifications based on their current use. These are agricultural property, commercial property, industrial property and residential property.

From the perspective of the economic development value of land, the most obvious measure of winning in the land use game is the profit from the sale of land and buildings (Berke et al., 2006). According to Nils et al. (2014), in urban areas variations in the price of land and properties reflect the locational/geographical advantages of a particular site, local externalities and governmental policies regulating its use. Because, the land is a resource unique at least in terms of its geographical location (Peter and Martin, 2003). Similarly, Marina (2012), indicated that land value is affected by property formation through alteration of land plots from one activity to another, and occurs through planning regulations that affect property values.

Different studies have shown that during urban development activities, the urban land use pattern changes dramatically through different factors, such factors also have impact on property value i.e. residential properties. Property value refers to the market value of a particular interest in landed properties; the amount of money which can be obtained for the interest at a particular time from persons able and willing to purchase or rent it (Adebayo, 2009). Therefore, various factors are affecting this value. For example, Emmanuel and Wan Zahari (2016), indicated that land use regulation is the highest influencing factor for land use change which affected residential rental value. Many land use regulations actually increase property value by creating positive amenity and scarcity effects but it might also create a negative restriction effect (William and Andrew, 2007). Similarly, Tesfaye (2015), indicated that informality in the land market, especially in the urban fringe, is the major cause of land use change that affected property values in the city of Hawassa.

Another study by Oruonye (2014), stated that among the factors that influence land use change includes infrastructure development, local planning policies; road construction plays a great role for land use change. Correspondingly, increase the values of both residential and commercial properties because of their proximity to the road. Similarly, Berke et al. (2006), stated the provision of road for areas to less advantaged communities create changing of land use.

The above studies show that real estate market demand by growing populations, informality in the land market, nearby developments, road construction projects and land use regulations are the major causes for land use change that affected the values of properties. Therefore, such urban phenomenon is extensively demonstrated in Addis Ababa, a capital city of Ethiopia. According to central statistical agency of Ethiopia population projection report, the estimated population of Addis Ababa in 2017 is 3,434,000 million people, covers around 18% of the urban population of the country (CSA, 2013). It has an estimated area of 54,000 hectares. Land uses are dramatically changing and the values of both residential and non-residential properties are rising now in the city. Such land use changes and property values are affected by slum clearance in the inner city old overcrowded neighborhoods and through the physical expansion of the city to the periphery. Through this process, new patterns of property developments are emerging which changes the previous land use pattern and affects the values of properties i.e. residential properties. Therefore, this study has an emphasis on identifying the factors for land use change that affect residential property values and how the change affects its value. It in fact used a case approach and took a vicinity most representative in the city (CMC area of Addis Ababa) to undertake the study.

### 1.2 Statement of the problem

The rapid growth of many cities in the developing world as a result of urbanization, population migration, and economic development produces numerous challenges. This rapid growth creates a demand of the scarce land resource for the construction of different commercial, industrial, and residential buildings as well as infrastructure development (Pierre, 2014) by changing agricultural lands to urban uses. This change has brought different impacts includes social, economic & environmental. For instance, according to Gaylan (2017), the changes in land use have a significant role in the escalation of land surface temperature. Accordingly, land use changes mainly driven by population growth and economic development through infilling of areas and clearing of vegetation resulted in a wide range of environmental impacts (Ashraf and Yasushi, 2009). This is obvious in Addis Ababa, where the city is expanding horizontally and agricultural lands are conversing into

different urban uses. For example, urban expansion have an impact on the livelihood of the farming communities of Addis Ababa because their way of life is highly dependent on agricultural economic sources (Feyera, 2005). Also, urban sprawl caused agricultural land conversion that seriously affected agricultural production at Dukem town (Diriba et al., 2016).

In the same way, urban land use changes through the conversion of one activity into another uses affected the values of land and properties. The effects of urban land use changes on property values might be positive (rise in property value) or negative (fall in property value) (Emmanuel and Wan Zahari, 2016). Researchers identified and examine the determinants of land use changes that affect residential properties value in their respective study areas. For example, Emmanuel and Wan Zahari (2016), identified an increase in population, safety and security, public utilities, and land use planning regulation found to be the influencing factors affected residential rental value. Similarly, housing prices increase with their proximity to neighborhood commercial land uses and where more services and jobs are available (Yan and Gerrit, 2004). Likewise, the pattern of property use change has a positive implication on the rental value of affected properties (Adegunle et al., 2016). Adebayo (2009), also identified the influences of land use change that affected property values like planning regulations, infrastructure facilities, accessibility to transportation, and complementarity of activities. According to Oruonye (2014), closeness to the new road, level of development in the area, infrastructure development, agglomeration of business activities in the neighborhood are the influential factors for land use change that affected properties value and the effect increases both rental and sale values of properties. However, the above studies dominantly used only a survey method and descriptive approaches for the investigations of the situations in their respective study area.

Now, for Ethiopian major cities like Addis Ababa, the value of lands and residential properties are rising from time to time in recent years. Due to urbanization and population migration from different cities and rural areas of Ethiopia in search of good life and job opportunities; residential properties are highly demanded. As result, now the city of Addis Ababa is stretching horizontally to accommodate the needs of its growing population. As an effect, the urban land use pattern changes dramatically and a new pattern of residential property developments such as condominium housing, villa, informal and other residential developments are emerging. Hitherto, little researches have been carried out in Ethiopia in regards to land use change but not for the property value. A research however has been done in the area of property valuation practice for compensation during

expropriation (Belachew, 2013) and land use change and land value by (Abera and Mehari, 2017) which basically focused on determinants of land use and land value change. Most of the researches have been focused on the causes of land use change and its impact on the socio-economic wellbeing of the society and on the environment as highlighted in (Feyera, 2005); Diriba et al., 2016; Haile and Assefa, 2013; Nigussie, 2012; Tesfaye, 2015; Tahir et al., 2013; Bamlaku, 2009; Gebrekidan et al., 2014; Belay, 2002) works. Nonetheless, studies on the nexus between urban land use change and residential property values have not been covered by other researchers in Addis Ababa, which quite necessitates the conduct of a research to relate urban land use change and residential property values.

That being said, the counter factual argument that required to do this research in Addis Ababa is that; as the uses of one property/land changes from one activity to another, its value also changes correspondingly. In fact, when any land becomes built-up (changes in use) its value also change accordingly as land & construction works are considered to have their own value (UN-ECE, 1996; Xinhao and Rainer, 2007). Therefore, determining the changes in value as a result of the alterations of land use is a significant and an imperative issue in the residential property development process of Addis Ababa. Therefore, this research that assesses the impacts of urban land use changes on residential property values plays an important role to design sound policies and strategies related to urban land use change and residential property valuation. The study will indeed be expected to fill a knowledge gap in the relationship between land use change and residential property value; by identifying the changes of land use, and the driving forces for urban land use changes that affect the values of residential properties as well as how the changes affect that residential property values in Addis Ababa, Bole sub city in general and the study area in particular.

However, different studies elsewhere in the glob assess the situation (land use change and residential property values) through survey method (to collect a data), descriptive analysis and Structural Equation Modeling (SEM) (to analyze the collected data) that have been found to have some limitations that could affect the quality of the results made from the analysis of data collected especially when dealing to assess the changes of land use and to identify or rank the relative importance of significant variables of such studies. Therefore, this study will attempt to examine the impact of land use change on residential property values by considering the limitations/gaps that identified from other studies such as spatial data/analysis and Relative Importance Index (RII) techniques. Additionally, the study also tried to estimate the market values of affected residential

properties with appropriate valuation techniques in the study area. Furthermore, the conclusions of this study will be directed towards adding knowledge to the existing theory about the cause and effect relationship between urban land use change and residential property values.

### 1.3 Research objectives

The main objective of the study is to investigate the impact of urban land use changes on residential property values with a particular reference to CMC-Safari area located at Bole sub-city of Addis Ababa City, Ethiopia. This is undertaken by identifying the driving forces of land use changes that affect residential property values and the impacts of such changes in the values of residential properties in the study area.

The study has also the ensuing specific objectives that chiefly dwell on the study area's features.

- To assess urban land use changes.
- To identify the driving forces for urban land use change that influence residential property values.
- To examine the impacts of urban land use change on residential property values.
- To estimate the market values of affected residential properties with appropriate valuation techniques.
- To come up with possible policy recommendations based on results of the findings.

### 1.4 Research questions

The main research question of this study is:

- How urban land use change affect residential property values in the study area?

Specifically, the intended research attempts to respond to the ensuing questions.

- What are the changes in urban land use in the study area?
- What are the major determinants of urban land use change that affect residential property values?
- How urban land use change affects residential property values?
- How much will be the market values of affected residential properties in the date of valuation?
- What possible policy interventions can be recommended for positively the goading land use change which affects residential property values?

## 1.5 Research Methodology

### 1.5.1 Description of the study area

The study area is located in Addis Ababa city Eastern expansion area. Specifically, it is found in Bole sub-city in a locality named CMC – Safari (at the back of CMC residential site) encompassing part Woreda 08 with an estimated 75 hectares of land. It is surrounded by CMC residential site in the North direction, major road to touch the study area to the East direction which passes from CMC roundabout to Summit condominium through Safari roundabout (from North to South direction), another major road also touches the study area in the South direction which passes from Ayat through Safari roundabout to Sahalite Mihret direction (East to West direction). In addition, there is a river touch the study area in the West direction, which falls from North to South direction.

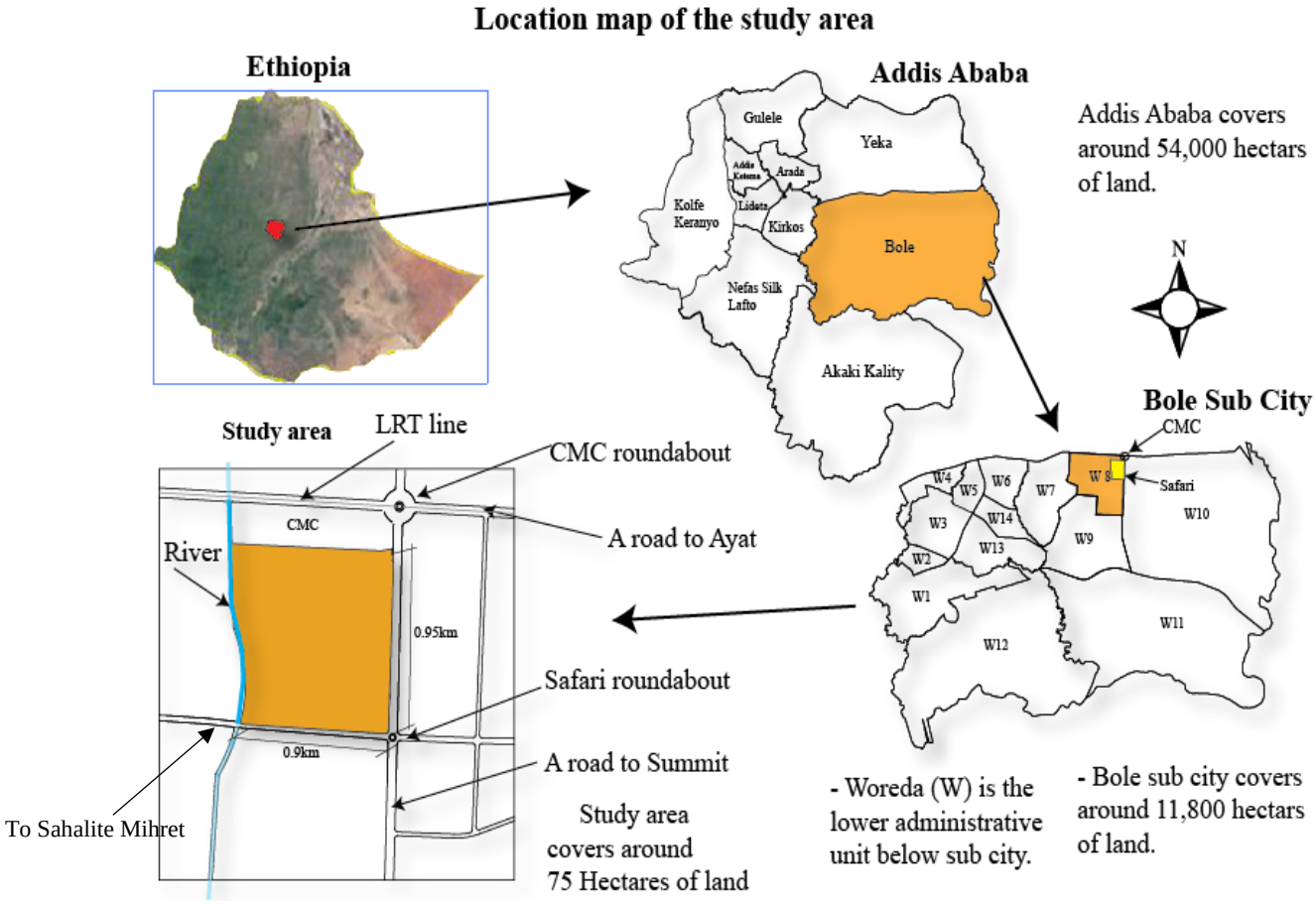



Figure 1: Location map which indicates the location of the study area.

Source: by the author

The study area is mainly residential in nature. There are also another complementary commercial and service activities i.e. schools, clinics, shops, and green areas. Development projects are also available in the area including road construction and infrastructure development. The area is characterized by commercial activities along the major roads i.e. banks, cafes, shops, clinics, private schools etc. and dominated by residential properties inside the neighborhood i.e. single family detached villas and apartment buildings, making one of the highly demanded vicinity in the city which in return drive rental and sale value to be high. The building height of residential properties in the study area range between G+0 and G+3. The minimum and maximum parcel size of residential properties in the study area is 72 and 500 square meters, respectively.

The rationale behind selection of the CMC –Safari site is due to its representativeness with two grand reasons. *First,* the significant change of land use has been happening in the last 15 years (because in 2003 the study area was 93% farmland but now 98% has used for urban functions) and the growth direction of the city, in general, is towards directly to potential lands on the study area in the sub-city. *Second,* the case study area was identified by the City's 2002 master plan as the City's major expansion area for residential use (ORAAMP, 2002). This has caused massive residential property developments and transactions in the study area in comparison to other locations and therefore the study area has a gigantic potential to portray the relationship between urban land use changes and residential property values than any other spots in the City.

### 1.5.2 Research design

The research design is the conceptual structure in which research is conducted as well as the blueprint for the collection, measurement, and analysis of data ( Kothari, 2004). Research design therefore includes description of the study area, the type and sources of data, methods of sampling, methods of data collection, methods of data analysis, the time as well as cost/budgets of the study. Some scholars called methodology design (ZINA, 2004) which is the plan for conducting a study that includes the methods and tools for data collection. According to Kothari (2004), research design is very important for the smooth flow of the research operation by yielding a maximum information with a minimum expenditure of effort, time and money.

The thesis has both theoretical and contextual parts which seek to examine urban land use change and residential property value. The theoretical parts were assessed through reviewing and analysis of archival documents from secondary sources while the contextual parts covered the issue of

urban land use change and residential property value in the context of the study area (CMC – Safari site). A study is a descriptive and explanatory type of research which describes the situation or the association between variables of the influencing factors for urban land use change that affects residential property values and also to explain how urban land use changes affect residential property value. A descriptive research sets out to describe "what is"; and an explanatory research aims at establishing the cause and effect relationship between variables (Abiy et al., 2009). According to Abiye et al. (2009), an explanatory research is a continuation of descriptive research, and the researcher goes beyond merely describing the characteristics, to analyze and explain why and how something is happening.

Following this, the study estimated affected residential properties with appropriate valuation techniques by selecting two affected residential properties in the study area.

A case study method of investigation was applied to the selected case from *Bole Sub City*. Case study research method is pertinent when the research question address both descriptive type of questions (i.e. what is happening? And what has happened?) And an explanatory type of questions (i.e. how or why did something happen?) (Robert, 2012). It is very important for the analysis of a situation clearly. Case studies emphasize detailed contextual analysis of a limited number of events or conditions and their relationships (Susan, 1997; Abiy et al., 2009). The case should directly relate to the purpose of the study and answer the research questions properly (Susan, 1997).

The ultimate reason behind opting for a case study approach for this research in the presence of other methods is due to the nature of the research questions (have both descriptive and explanatory type of queries) that necessitate such approach. The following diagram *(figure 2)* shows the research design.

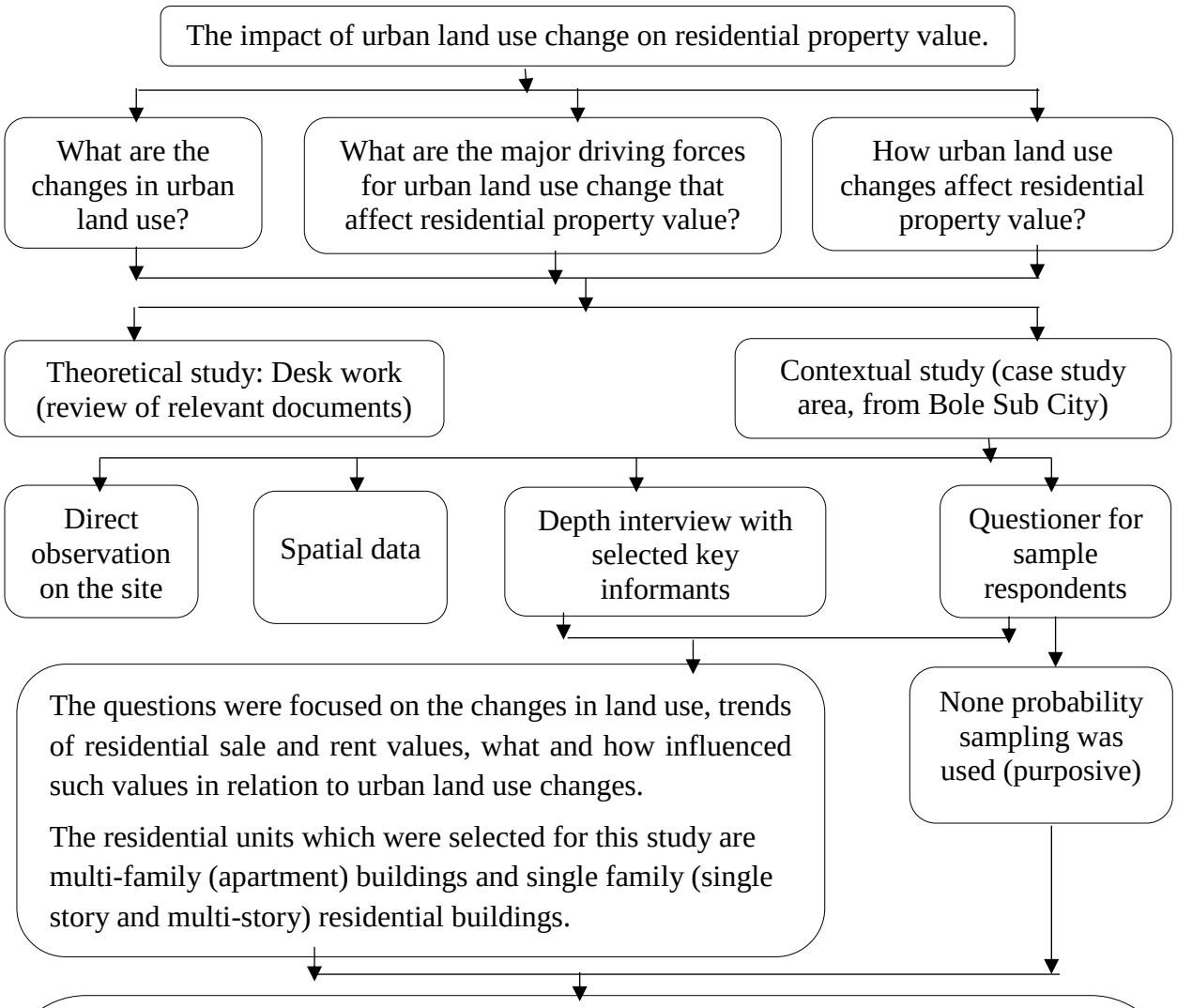



Figure 2: The conceptual framework of the research design

Source: Author's formulation

### 1.5.3 Data source and methods of data collection

The required information for the study were collected from both primary and secondary sources. Primary data is collected from the selected site (CMC- Safari) with the help of spatial data, key informants interview, household survey and direct field observation. Secondary data is gathered from related literature, both published/unpublished data and documents from relevant offices.

**Spatial data: -** this shows the spatial and temporal characteristics of land use changes in the case study area from 2003 to 2018 G.C. based on multi-temporal satellite information. For the study, five satellite images were downloaded from Google Earth online database; for the years 2003, 2005, 2008, 2013, and 2017. In addition, parcel data (of the study area) for the year 2016 was acquired from Bole Sub City Urban Planning Office (BSCUPO).

**Review of relevant literature: -** this involved review of appropriate literature and documents. The data included Addis Ababa master plan document (2002) from Addis Ababa city planning project office (AACPPO) as well as reports and published articles related to land use change and residential property values from various sources.

**Interviews (structured and unstructured):-** Depth interview was conducted with key informants from brokers working in the study area, real property valuators, real estate developer (sunshine), and residential property owners/tenants in the study area as well as informative urban planners about the area.

**Survey questionnaires: -** survey questionnaires were prepared for households, brokers and Sunshine real-estate Company based on the guide directly related to the research objectives/questions which includes: the values of residential properties and its trend, the major influencing factors for urban land use change that affect residential property values, and the impacts of those changes on the values of residential properties in the study area.

**Direct observation: -** In this study, physical inspection/observation of the CMC–Safari area was conducted to obtain firsthand information about the values of residential properties and various land uses in the study area using audio-visual and other instruments.

### 1.5.4 Methods of sampling

Nonprobability sampling was applied to examine the impacts of urban land use changes on residential property values in the study area. Purposive sampling technique was adopted to select

50 survey respondents (46 residential property owners/tenants and 4 brokers) in addition to 15 key informants (4 from brokers from the study area, 4 from residential property owners/tenants, 3 from real property appraisers, 1 from private real estate developers, 1 from Addis Ababa city planning project office experience to the study area, 1 urban planner from Bole sub-city Urban Planning office and 1 property valuator from Bole sub-city). Additionally, for regression analysis (to examine the impact) all 54 rental single-family residential properties were selected. All in all, a total of 119 respondents were selected.

Purposive sampling technique was adopted principally because the nature of the research itself, and characteristics of the sources of data. *First,* it was very difficult to obtain a list of affected and none affected residential properties by land use change in the case study area. Because the sample has to be included both affected and none affected residential properties. *Second,* it was also very difficult to get the exact number of brokers and real property appraisers/professionals who works in the study area. *Third,* the nature of the data was also another challenge to apply probability sampling technique. For instance, there might be residential housing units in the case study area which are not similar in nature. Therefore, it needs purposively to include different types of residential properties to the sample.

### 1.5.5 Methods of data analysis

Most researchers investigated the effects of urban land use changes on property values by using different methods for instance, Hedonic pricing model, Structural Equation Modeling (SEM) and Analysis of Moment Structures (AMOS) (Emmanuel and Wan Zahari, 2016); and by simple descriptive analysis approach (Adegunle et al., 2016; Adebayo, 2009; Oruonye, 2014). The methodology adopted is based on the availability of data, the researcher's background, the nature of the research questions and other parameters. This study employed the *subsequent analysis technique* for the conduct of the study.

***Spatial analysis:*** satellite images for the year 2003, 2005, 2008, 2013, and 2017 G.C.'s were visually interpreted and analyzed by the researcher which were in fact used to examine the changes over time between independently classified land cover data that can be used to explain the nature and location of changes (Duguma, 2017). In addition, based on the parceled data of the year 2016, the researcher went to the field and coded the existing land uses on the map, and finally, the existing land use map was produced with GIS software and the rate of the changes were calculated.

***Relative Importance Index (RII) analysis:*** the data generated from the survey on the determinant factors were further analyzed using relative importance index. It is a type of analysis technique that shows the relative importance of predictors (independent variables) when the independent variables are correlated with each other (Somiah et al., 2015). For this study, it also showed which variable is most important than others based on a five-point scale (1- strongly disagree, 2- disagree, 3- neither, 4- agree and 5 – strongly agree) based on responses of the interviewees approached in order to empirically discover the factors accounting for land use change that affected residential property values at CMC-Safari area. Having RII at hand, respondents were in fact asked to indicate the most significant factors on each of the nine identified elements from the literature. Based on (Johnson and LeBreton, 2004 as cited in Somiah et al., 2015) work, the following formula was used in the calculation of Relative Importance Index (RII) for the study.

$$\mathrm{RII} = \frac{\sum W}{A * N}$$

Where, W – weighing given to each statement by respondents and ranges from 1 to 5; A – higher response integer (5); and N – total number of respondents.

***Multiple regression analysis:*** for this study multiple regression analysis technique was applied in order to infer some conclusions about the impacts of urban land use changes (independent variable) on residential property values (dependent variable). The sample variable which were analyzed in the regression is cross-sectional data of rental values of single-family residential properties.

***Descriptive analysis***: all in all, the above analysis are supported by descriptions with frequencies, percentages and narration with text in order to examine the impacts of urban land use changes on residential property values with a comparative analysis of two periods before and after changes of urban land use in the study area. In addition, trends in residential property value changes in different time periods were also clearly analyzed with SPSS and excel. The variables which were analyzed in the study are time-serious data of both sale and rental price changes of residential properties of the two periods (before and after 2015 G.C). In the same way, the quantitative data was processed with the help of Microsoft Excel and SPSS software. The data gathered from key informants and observation are analyzed in the form of narratives, tabular forms, and maps.

***Estimation/valuation:*** two sample affected residential properties are estimated with appropriate valuation techniques. The estimation of values of sample affected residential properties was accomplished with the help of Microsoft Excel application and presented in the form of numbers.

Table 1: Summary of the research methodology

| No | Research questions | Data type and source | Methods of data collection | Methods of sampling | Methods of data analysis |
|---|---|---|---|---|---|
| 1. | What are the changes of land use in the study area? | *Spatial data:* satellite images (from google earth), parceled data (from BSCUPO) | Visual image-interpretation<br>Field-observation | - | Spatial analysis with auto CAD and GIS software |
| 2. | What are the determinant factors of land use change that affect residential property values in the study area? | *Qualitative data* i.e. determinant factors and its impacts on residential property values (households, brokers, urban planners and property valuers). | Survey-questionnaire<br>Key informant-interview | Non-probability (purposive) sampling | Relative Importance Index (RII) analysis with excel |
| 3. | How land use change affects residential property values in the study area? | *Quantitative data* i.e. sale and rent prices of residential properties (from tenants, brokers & real estate developer) | - Interview<br>- Survey-questionnaire | | Regression analysis with SPSS and<br>Descriptive analysis |
| 4. | How much is the market values of affected residential properties in the study area? | Sale prices of recently sold comparable residential properties.<br>Physical/economic characteristics of both subject and comparable properties | Physical-inspection<br>Interview | - | Quantitative-analysis/estimation with Microsoft Excel |

Source: by the author

### 1.6 Scope of the study

*Geographically*, the study was conducted at Bole Sub City, CMC – Safari locality which is located in Addis Ababa, the capital City of Ethiopia. That is the area where significant land use changes have been happening from agriculture to urban use and a huge number of residential property transactions are undertaking.

*Thematically*, the study mainly focused on the following four issues which all applies to the identified study area. (i) Assessment of land use changes, (ii) identifications of the causes of urban land use changes that affect residential property value, (iii) Assessment of the impacts of such changes on the surrounding residential properties value subject to the theoretical and contextual issues understudy, and (iv) valuation of sample affected residential properties with appropriate valuation techniques. For this study, both rental and sale prices of residential properties before and after 2015 G.C were the information most required. Both multi-family (apartment) buildings and single-family (single-story and multi-story) residential houses are selected to the study.

*Temporally*, the cross-sectional primary data was collected on June 2018 with the inquiries of the above issues.

### 1.7 Limitation of the study

A critical problem was the availability of relevant literature and documents especially, local literature or studies in relation to residential property value and urban land use changes. Another limitation was empirical pieces of evidence about the impact of land use change on residential property value; as a result, the case studies/empirical evidences discussed in the paper only focused on the Nigerian cases. The regression analysis was only on rental single-family residential properties because of lack of enough sale/transaction prices of sold residential properties in the study area. Time, manpower and financial constraints were also other limitations for incorporating multiple case areas for the study.

### 1.8 Significance of the study

This study expected to fill a knowledge gap of the relationship between land use change and residential property value; by identifying the driving forces for land use change that affects residential property values and by examining effects of land use changes on the values of residential properties in Addis Ababa in general and the study area in particular. It is also important

for those policymakers and urban professionals in order to incorporate the impacts of different land use changes and land use activities on residential properties values.

The study will highly significant for those property valuation professionals interested to estimate the values of land and properties in relation to the locational impacts of different urban land use activities as well as forecasting the impacts of the future land use changes on the specific properties based on the past and the current trends of changes. It also provides information for key stakeholders to take pro-active measures to manage land use changes to minimize its negative impacts on the efficiency of the residential property market. Finally, the findings of this study will be used as a direction for further research work in relation to land use change and property value. In general, the findings of this study have contributed greatly to the body of knowledge of urban and real estate economics in general and land use and residential property values in particular, especially as cities of developing countries where their cities are expanding horizontally with a prompt speed and correspondingly the demand and values of residential properties, are increasing with alarming rate.

### 1.9 Organization of the paper

The structure of the thesis is organized into six parts.

*The first part* of the paper incorporates the preliminary pages which include a title page, signed approval sheet, declaration, acknowledgment, table of contents, list of tables, list of figures, list of appendixes, list of abbreviations and acronyms, and the abstract of the study.

*The second part* of the thesis is about the first chapter of the study which is called the introduction part. Which includes the following main elements: background of the study, problem statement, research objectives, research questions, research methodology (description of the case study area, research design, data source and methods of data collection, methods of sampling, and methods of data analysis), scope of the study, limitation of the study, significance of the study and organization of the thesis/paper.

*The third part* of the thesis is the second chapter of the study which is called a literature review. Which includes and presents brief descriptions of the theoretical backgrounds and empirical pieces evidence about the study. Such as basic concepts and definitions of land use change and residential property values, the influencing factors for urban land use change that affect residential property values, impacts of land use changes on residential property values, and techniques of valuations of

residential properties. Finally, lessons learned from the literature and some terminologies applicable for this study are included in the literature review part.

*The fourth part* of the thesis is the third chapter of the study which is called the findings of the study. It is detail description, analysis and presentations of findings of the study based on the research questions i.e. the changes of land use in the study area, the determinant factors for land use changes that affect residential property values and the impacts of such changes on the value of residential properties in the study area as well as the estimation of the market value of affected residential properties in the date of valuation in the study area.

*The fifth part* of the thesis is the fourth chapter of the study which includes the conclusions and the recommendations of the study.

*Finally*, the sixth part of the thesis includes the bibliography (references used in the whole study) and annexes such as questioners, interview guides and different pictures which shows the case study area and other supplements are included at the end of the paper.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

The previous chapter is outlined in the introduction which indicated the overall context of the research. It includes the statement of the problem, the aim of the study, research questions, and the methodology adopted to answer the research questions as well as the significances of the study. This chapter is the extension of the previous chapter and presented the theoretical and empirical pieces of evidence about the impacts of urban land use change on residential property values. Which is very important to strengthen the objective of the study.

Urban land use change can be defined as the changing of the activities of the land from one type of use to another i.e. from farmlands into different urban activities. Consequently, urban areas are continually subject to changes in use pattern and value, because as social, political and economic factors making such changes with the resultant effect on residential property values. Residential properties are defined as parcels with or without buildings which are used for or probably will be used for residential purposes; e.g. apartment buildings, single-story and multi-story housing units, condominium buildings etc. are classified as residential properties.

Based on this fact, in this subpart of the paper attempted to explore and review theoretical concepts and previously published works related to urban land use change and residential property value are discussed. Which are very important in order to strengthen the objective of this study. In the first part of this chapter, discussed the concepts and definitions of both urban land use change and residential property values. Also include the causes and effects of urban land use change, the concepts of property and property value, and determinates of residential property value. The second part is about the cause and effect relationship between urban land use change and residential property value. That is tried to identify and discussed influencing factors for urban land use change that affect residential property values. Similarly, the impact of such land use change on residential property value are discussed with taking different case studies. The conceptual framework (figure 3) developed by the researcher and the case studies from Nigeria as a case are mechanisms to show the relationship between them. In relation to that, techniques of property valuation which are crucial to estimating affected residential properties are discussed in this chapter. Finally, lessons learned from the literature containing various experiences from different empirical pieces of evidence are drawn that is directly related to the objective of the study.

## 2.2 Urban land use change

### 2.2.1 Definitions and concepts

Urban land use is one of the components of an urban plan among others i.e. road and transportation, infrastructure, housing and open space (Berke et al., 2006; Jordan, 2012). The land use component of an urban plan is considered as the most important part of a plan because everything that makes up a city has to be located somewhere; which indicates different uses and activities on the land (Jordan, 2012). Urban land use is dynamic, and change in response to population and economic growth, public and private decision, market and governmental actions (Berke et al., 2006). According to Berke et al. (2006), for metropolitan areas with high projected population growth and uncertain development dynamics, the task is more challenging since the drivers of land use change are more complex interrelated and unpredictable.

Urban land use change is a complex phenomenon differing greatly from place to place (Abera and Mehari, 2017). It can be defined as the changing of the activities of the land from one type of use to another i.e. from farmlands into different urban activities such as residential, commercial, and industrial as well as other related urban services. Accordingly, Adegunle et al. (2016), stated that change in use has been described as the use of land or buildings thereon for a purpose which is different from that for which the land or building was originally zoned and intended for. It is a phenomenon occurring in the urban environment as a result different urban development activities and the expansions of urban settlements. Thus, changes in urban land use in any society are inevitable irrespective of the genesis and nature of the changes, and such changes are part of the urban growth (Emmanuel and Wan Zahari, 2016; Adebayo, 2009). For economic reason, land and buildings will continue to change in use from a lower order to a higher order statue in order to attain optimal use (Adebayo, 2009). Most of the changes in land use in urban areas are due to as a result of urbanization, population growth, and economic development. Because land use is dynamic and changes with time and space due to anthropogenic pressures (Tahir et al., 2013).

### 2.2.2 Causes and effects urban land use change

Urban land use is the physical manifestations of social, economic, political, and environmental forces shaping the use of land in urban areas (Abera and Mehari, 2017; Adebayo, 2009). According to Abera and Mehari (2017), the spatial nature of land use in the urban area is largely influenced by the national policies and economy such as housing policy, industrial policy, and development

of communication technologies. Different factors are considered for the causes for land use change in urban areas. For instance, geologic changes such as earthquake and land subsidence. However, according to Berke et al. (2006), "the day to day causes result from; the activities of real estate developers (developers response to real estate market demand), public officials (government plans, policies, and regulations) and interest groups as they struggle to maintain, convert, and develop land in order to establish a future land use pattern that meets the community need".

Consequently, according to Hill (1989) as cited in Adebayo, (2009), identified the causes for urban land use change; includes personal choice, government policies & plans, a decision of developers, and the nature of the land itself. Urban growth will also alter the pattern of land use and land values within an urban area (Abera and Mehari, 2017; Adebayo, 2009). Most of the changes in land use in urban areas are in relation to urbanization, urban expansion, and sprawling (Diriba et al., 2016; Feyera, 2005). According to Diriba et al. (2016), industrialization, residential expansion, and infrastructure developments are the identified factors for urban land use change in the expansion areas of Addis Ababa. Expansion of informal land market is also another factor (Tesfaye, 2015).

Hence, the changes in land use in urban areas might have different effects on the environment and the socio-economic wellbeing of the urban residents and the surrounding hinterlands. The growth of urban areas create the changes in land use, that results in the escalation of land surface temperature by diminishing natural resources (Gaylan, 2017). Similarly, land use changes as a result of rapid urban expansion through infilling of low-lying areas and clearing of vegetation resulted in a wide range of environmental impacts (Ashraf and Yasushi, 2009). Moreover, urban sprawl & conversion of farmland into urban uses have seriously affected agricultural production & the socio-economic lives of farming communities (Diriba et al., 2016; Feyera, 2005).

In the same way, land use change in urban areas affect the values of land and properties. It has emerged along highway expansion of commercial strip development that creates the increasing of values surrounding the developments (Berke et al., 2006). Land use change result into, land being allocated to its highest and best use culminating in higher economic returns (Adebayo, 2009). Consequently, land use change affects land and property value in different ways i.e. the provision of infrastructure and road for areas to less advantaged communities creates the rising of property value as a result of access. Land regulations also affect the values of land and properties through zoning and subdivision laws by permitting and restricting uses in a given area.

## 2.3 Residential property value

### 2.3.1 Basic definitions and concepts of property

The word property has many dimensions and people are not usually capable of defining it without difficulty (Daniel and Melkamu, 2008). In general, property describes a legal concept. It defines the relationship between people and things that is, the right of a person to possess, use, or own things (Daniel and Melkamu, 2008). Property refers to the rules that govern people access to and control of physical things (tangible assets) like land, natural resources, and manufactured goods as well as of non-physical things (intangible assets) such as inventions or contractual rights and financial claims (Belachew, 2013). According to Eggertsson (1996), as cited in Marina (2012), the three types of property rights to the owners of a property are; the right to use property including its transformation or destruction, the right to receive income by contracting with non-owners, and the right to permanently transfer the ownership right of a property to another person.

Properties might be personal or real. Personal property generally refers to everything else or the items which are movable and not a part of the land; which can be categorized into tangible and intangible (Appraisal Institute, 2013). Tangible personal property is something you can touch and is movable. Intangible personal property is a property that has no physical existence; for examples, patents, copyrights, trademarks etc.

Real property is generally referred to as rights in reality and these rights sometimes referred to a bundle of rights. A bundle of rights associated with the ownership of real estate likens the bundle of sticks, with each stick representing a distinct and separable right of the property owner, for example, the right to use, to sell, to inherit, to lease, even to destruct (International valuation standards committee (IVSC), 2003). While in some jurisdictions real estate and real property are used synonymously. But there is an important practical and operational distinction between the two. Real property means all rights, interests, and benefits related to the ownership of real estate, including any negative rights, interests or benefits relating to the interest being valued (Appraisal Institute, 2013; Royal Institution of Chartered Surveyors (RICS), 2012). These rights are both divisible and separable, meaning more than one party can have a portion of any given right. Whereas, real estate means, land and all items that are a natural part of the land (e.g. trees, minerals) and that have been attached to the land such as buildings or site improvements (Appraisal Institute, 2013; Royal Institution of Chartered Surveyors (RICS), 2012).

### 2.3.2 Types of real properties

There are different types of real properties classified based on their current use. According to Michigan State Tax Commission (2013), they are grouped into the following classifications:

*Residential real property: -* parcels with or without buildings, condominium apartments which are used for or probably will be used for residential purposes; e.g. apartment buildings (multifamily), single story housing units, multi-story housing units, condominium buildings etc. are classified as a residential real property. When a small part of a house is used for a commercial or retail operation and the house is in a residential area, the property will usually be classified as a residential. However, structures that were built for residential use but now used as a commercial use are not classified as residential. According to Herbert and Thomas (1982) as cited in Adebayo (2009), in most cities, residential properties cover 50-60%, comprising houses of various kinds ranging from detached houses, condominiums, and tenant houses of single rooms.

*Agricultural real property: -* it includes parcels used partially or wholly for agricultural operations, with or without buildings. It might be a vacant parcel, a wooded parcel, a parcel with agricultural buildings such as dairy farming, raising livestock, tree farming, crop cultivation etc.

*Commercial real property: -* includes parcels that are used for commercial purposes, whether wholesale, retail, or service, with or without buildings. Structures that were built for residential use but now used as commercial, office, or retail spaces, are included in this category.

*Industrial real property: -* it includes parcels used for manufacturing and processing purposes, with/without buildings. Also comprises removal or processing of gravel, stone quarries, or mineral, warehouses and storage areas are also classified in industrial real properties.

*Developmental real property: -* This classification is normally used in areas of changing use near a significant population center, includes farmland or open space adjacent to a population center.

*Timber–cutover real property: -* it includes parcels stocked with forest products of merchantable, or no merchantable products, and marshlands or other barren lands.

### 2.3.3 The concept of property value

According to Appraisal Institute (2015), value is defined as the monetary relationship between properties and those who buy, sell, or use those properties. Consequently, a property valuer's definition of value is the present price for the right to receive income or capital in the future to the owner (Michael, 2009). Thus, value by itself is a subjective concept in that a property will have

different values at any point in time according to the purpose for which it is being valued and the circumstances of the party for whom it is being valued (Michael, 2009). Understanding the basic distinctions among the words price, cost and value which have similar meanings in the everyday use is very important in property valuation practice. ***Price*** is defined as the amount asked, offered, or paid for a good or service; it is generally an indication of a relative value placed upon the goods or services by the particular buyers or sellers under particular circumstances (Appraisal Institute, 2013). It may/may not have any relation to the value which might be ascribed to the goods/services by others (International valuation standards committee (IVSC), 2003). According to Royal Institute of Chartered Surveyors (RICS) (2003) as cited in Michael (2009), price is defined as the actual observable exchange amount in the open market. Yet, ***Cost*** is the price paid or the amount required to create/produce the good/service (Appraisal Institute, 2013; International valuation standards committee (IVSC), 2003).

On the other hand, According to Royal Institute of Chartered Surveyors (RICS) (2003) as cited in Michael (2009), value is an estimate of the price that would be achieved if the property were to be sold in the open market. Also, International valuation standards committee (2003) defined as:

*'Value is an economic concept referring to the price most likely to be concluded by the buyers and sellers of a good or service that is available for purchase. Value is not a fact, but an estimate of the likely price to be paid for goods and services at a given time in accordance with a particular definition of value. The economic concept of value reflects a markets view of the benefits that accrue to one who owns the goods or receives the services as of the effective date of valuation'.*

In the real estate context, the following factors of production are the basic measures of real property value i.e. land, labor, capital and entrepreneurial coordination. The combined effect of these components and their relationships create the value of a property as a whole (Appraisal Institute, 2013). In property valuation, a value is expressed as a market value. According to International valuation standards committee (IVSC) (2003); Royal Institution of Chartered Surveyors (RICS) (2012), market value is defined as:

*'The estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in the arm length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently, and without compulsion'.*

Thus, market value is the estimated amount for which a property should exchange on the date of valuation on the following conditions ((Maria, 2010; Royal Institution of Chartered Surveyors (RICS), 2012): the transaction is conducted between a willing buyer and a willing seller (a buyer who is motivated to purchase in accordance with the realities of the current market and the seller also motivated to sell the property of the best price attainable in the open market) , the transaction is arm's length ( the transaction is conducted between the parties without any particular or special relationship i.e. family), the parties act without compulsion, the parties act knowledgeably and prudently ( each party is motivated to undertake the transaction without any force from others), and the transaction takes place after proper marketing ( the property should be exposed to the market in the most appropriate manner and sufficient exposure period).

Generally, the market value of the land is based on the "highest and best use" concept; reflects the utility & the performance of land in the context of a market; & constituting the difference between land value alone & total market value as improved (International valuation standards committee (IVSC), 2003). According to International Valuation Standards Committee (2003), highest and best use is defined as the most probable use of a property which is physically possible, legally permissible, financially feasible, and which results in the highest value of a property being valued.

### 2.3.4 Determinants of residential property value

Both rental and capital values of properties are affected by various factors including property specific factors and factors out of the property itself. In general, the values of both residential and none residential properties are determined by demand and supply factors. According to (Michael, 2009; Belachew, 2013), if there is a little supply of properties and a greater demand of it in the market, the values of properties might be higher. Thus, the pattern of land use which affects properties value in an urban area is a reflection of competition for sites between various uses operating through the forces of supply and demand (Michael, 2009). In real estate business, the most determinate factor for property value is location, location, and location (Domninique, 2002). According to Belachew (2013), certain sites have locational advantages, greater demand, and greater value because they may have a beautiful view, good rail and road connections without noise, and all kind of public and private services. If we compare similar properties in different areas, they will have different values with respect to their locational characters and importance. Some areas have good access to physical infrastructure and public services and other might not have. Similarly, sites in urban areas will tend to be devoted to the use that produces the highest

value, which will largely be determined by accessibility to transportation and services; complementarity of different land use activities and availability of a different mix of activities, market, and services (Michael, 2009). According to Wyatt (2007) as cited in Belachew (2013), determinants of property values can be classified as property specific factors and factors outside of the property. Property-specific factors include size, age, condition, external appearance, car parking, site improvements, the legality of the property, easements and covenants attached to the property, planning controls etc. Factors outside the property include the national situation, the international situation, and neighborhood characteristics.

Thus, from different pieces of empirical evidence, there are also many factors that affect property values. Availability of infrastructures like water, sanitation, and electrical installations have a significant positive effect on housing prices in Rwanda (Pierre, 2014). Similarly, a study on south London indicated that the positive factors for residential property value are access to urban amenities and the negative factors are accessibility to high voltage overhead transmission lines (Daniel et al., 2011). Another study by Kenneth (2012), founded that, excess liquidity, stock price and interest rates are significant factors affecting the price of residential housing units in Hong Kong. Likewise, a study on the city of Izmir in the case of Forbes pedestrian way, Turkey by Seval (2007), indicated that proximity to the pedestrian way and level of perceived quality of pedestrian way are significant determinants of rental prices of residential properties. Other important factors affecting residential property values are the number of bedrooms, land area, and location (Janet and Yue, 2007). Another empirical evidence, Lagos by Olayinka et al. (2013), discovered that locational, structural (size, number of bedrooms, design quality) and neighborhood characteristics (proximity to shops and services, infrastructure development, power supply, as well as security) are the main factors that affect residential property values. Land use regulation is also another factor for property values. Many land use regulations actually increase property value by creating positive amenity effects and scarcity effects, but it might also create negative restriction effects (William and Andrew, 2007). Amenity effect occurs when land use regulations protect, enhance or create amenities that benefit property owner i.e. infrastructure provision (William, 2006). Scarcity effects occur by increasing the scarcity of land available for a particular use in a particular location, the prices for those lands are bid up in the market (William, 2006). Restriction effects occur when a regulation restricts the use of a particular piece of land so that its “highest and best use” is prevented, and expected to decrease its value (William and Andrew, 2007).

Generally, according to Appraisal Institute (2013), property value is affected by the interaction of four interrelated basic factors: *Physical forces* such as topography, public services, transportation routes etc. *Economic forces* such as the fundamental relationship between demand and supply, availability of employment, economic basis of region, availability of mortgage credit etc. *Political and governmental forces* which include the governmental controls over money and credit, building codes and regulations, health and safety codes, rent controls. *Social forces* include population age and gender, family size, lifestyle, moral attitudes, attitude towards education.

## 2.4 Urban land use change and residential property value

### 2.4.1 Determinants of urban land use change that affect residential property value

Urban areas are continually subject to change in use pattern and therefore, in value (Adebayo, 2009). As social and economic factors making such changes with the resultant effect on residential property values. Most of the factors for urban land use changes are the determinant factors for both capital and rental values of residential properties. According to Emmanuel and Wan Zahari (2016), increase in population, intra-urban migration, security and safety, public utilities, environmental quality and land use regulations has a significant influence on urban land use change that affected residential property rental values. Similarly, Adegunle et al. (2016), identified planning regulation, security, population size, accessibility, infrastructure facilities, investment potential (demand), and agglomeration of business activities are the major determinants for change in use which are affected both residential and non-residential property values. Also, Adebayo (2009), identified planning regulations, demand and supply, infrastructure facilities, accessibility to transport, and complementarity of activities. According to Oruonye (2014), closeness to the new road, topography, accessibility of plot, level of development in the area, infrastructure development, economic activities in the neighborhood are the influential factors for land use change that affected both residential and non-residential properties value.

### 2.4.2 Impacts of urban land use change on residential property value (case studies)

According to pieces of different empirical evidence, most of the factors for urban land use change that affects residential property values have a positive effect on both rental & capital values of it.

**Case study 1:** A study on Kaduna metropolis, Nigeria by Emmanuel and Wan Zahari (2016), discovered that the identified determinant factors influencing land use change had cumulatively influenced land use change by 87%; and land use change affected residential rental value at 27%

in the study area. Survey research design was adopted to collect data and Structural Equation Modeling (SEM) and Analysis of Moment Structures (AMOS) was used to analyze the data.

**Case study 2:** Similarly, a study on the Taraba state Nigeria by Oruonye (2014), revealed that land use along the major newly constructed roads has undergone a substantial level of change from agriculture farmlands and open fields to residential and commercial uses; this change is a corresponding increase in both rental and capital values of residential and non-residential properties on both sides of the newly constructed roads in the study area. Survey research design was adopted to collect data and analysis of variance technique & simple descriptive statistics was used to analyze the data. Furthermore, physical inspection of the study area was undertaken to obtain firsthand information on various uses and property values in the study area.

**Case study 3:** Another study on the metropolitan Lagos, Nigeria by Adebayo (2009), founded that there have been remarkable changes in land use pattern from residential to commercial due to different identified factors for land use change that affected property values, this had led to corresponding increasing values of both residential and non-residential properties in the study area. Questioners were administered to collect data. The data obtained are analyzed with the use of simple descriptive statistics. In addition, a physical inspection of the study area was undertaken to obtain firsthand information on various uses in the area.

**Case study 4:** a similar study on Abeokuta, Ogun state Nigeria by Adegunle et al. (2016), revealed that the pattern of land and property use change has positive implication on the rental value of the affected residential and none-residential properties. The study was adopted a simple random sampling technique using structured questioners survey, observation, and interview for primary data; and secondary data were obtained through the review of relevant literature. The data obtained are analyzed with the use of simple descriptive analysis particularly frequency tables, percentages, and relative importance index as ranking model employed to identify the most significant determinants among others.

### 2.4.3 The Conceptual framework: shows the relationship between variables

The following diagram in *(figure 3)* shows the conceptual framework of the relationship between the dependent variable (residential property value) and different independent variables (determinates of urban land use change) which are affecting residential property values.

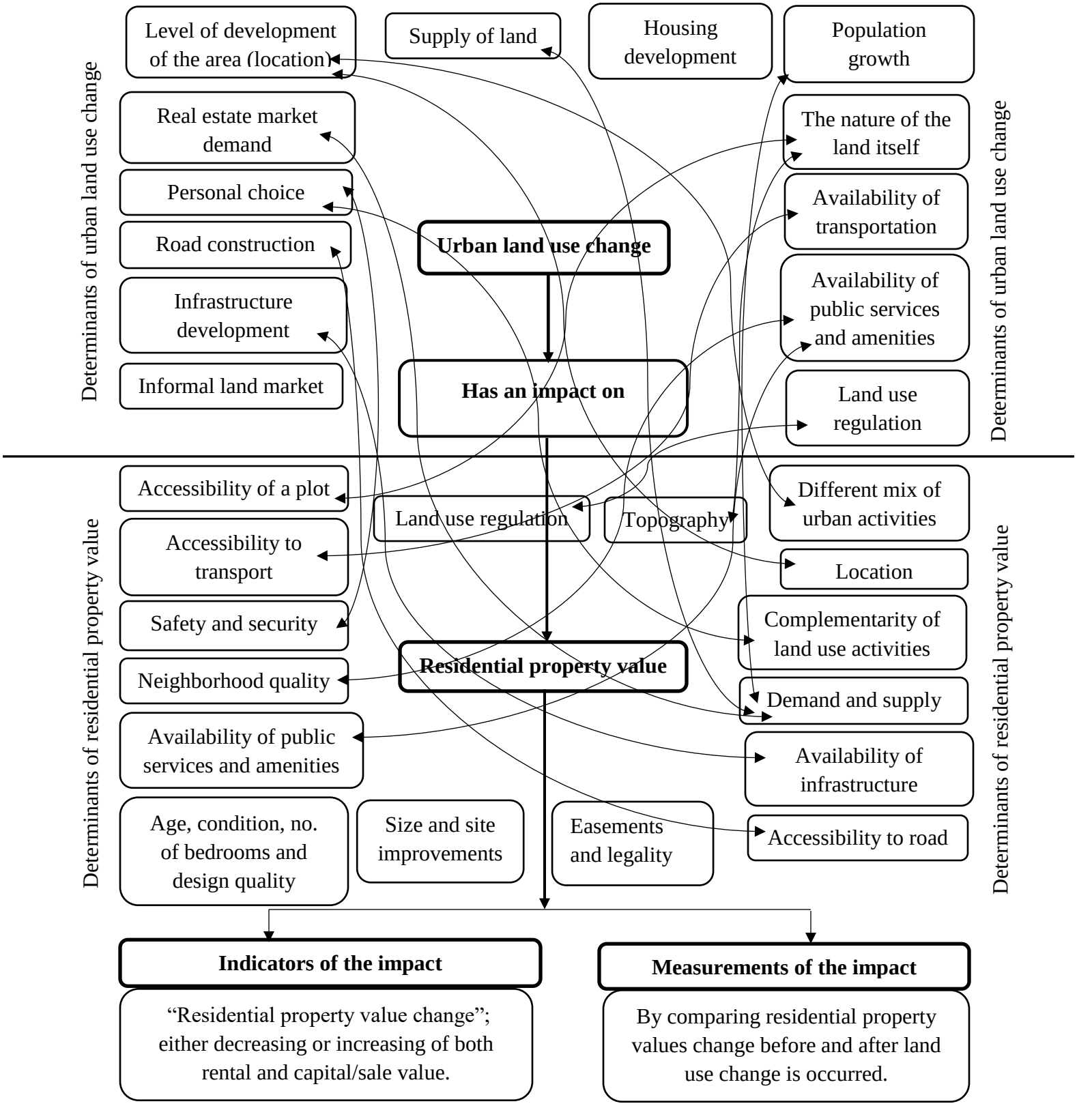



Figure 3: Conceptual framework: relationship between dependent and independent variables.

Source: By the author

## 2.5 Property market modeling

In econometrics, the statistical analysis of real estate market is mostly expressed and presented in the form of descriptive statistics and modeling. Real estate econometrics is defined as the application of statistical techniques to problems in the real estate market (Chris and Sotiris, 2010). Thus, according to Chris and Sotiris (2010), econometrics applied to real estate is useful for examining the effect on real estate markets of changes in economic conditions. Similarly, the building of econometric model is for real estate market requires a theoretical grasp of this market. Hedonic approach is one of the methods to model real estate market. It is used for evaluating the economic value of environmental goods such as parks, landscape qualities, water bodies etc. this approach is based on the assumption that goods can be considered as aggregates of different attributes. It also decomposes the transaction or rent price into various components such as property specific and non-property specific variables that affect property values (Richard, 2009). Consequently, in order to apply this approach, the collected data which is explanatory variables & explained variable has to be regressed statistically. The hedonic model has the following form:

$$V = f(X1i, X2i, X3i \ldots Xni) \quad \ldots\ldots 1$$

Where: V is property value; X1, X2…Xn are independent variables that affect property value.

Real property is a heterogeneous good that is comprised of a bundle of unique characteristics reflecting not only its location, but equally affected by other amenities such as the quality of neighborhood and infrastructure (Ajibola et al., 2012). According to Ge and Du (2007) as cited in Ajibola et al. (2012), opine that property value is an essential aspect of property markets worldwide and determined by a variety of factors and the determination of those factors are significant part of property valuation. These and other variety of factors have different level of relative contribution or significance/magnitude of effect on property values (Richard, 2009), thus these factors has to be evaluated with the model through regression analysis.

Regression analysis is the most important tool in real estate market analysis. It is concerned with describing and evaluating the relationship between a given variable and one or more other variables. More specifically, regression is an attempt to explain movements in a variable by reference to movements in one or more other variables (Chris and Sotiris, 2010). To make this more-clear, according to Chris and Sotiris (2010), “denote the variable whose movements the

regression seeks to explain by Y (dependent/explained variable) and the variables that are used to explain these variations by X1, X2…Xn (independent/explanatory variables). Hence, in this relatively simple setup, it would be said that variations in n variables (the Xs) cause changes in some other variable Y". Regression analysis can be classified as simple and multiple. Simple liner regression is defined as a single explanatory variable to predict the dependent variable, where as if more than one explanatory variable, it is called multiple linear regression (Chris and Sotiris, 2010). It would therefore to determine to what extent this relationship can be described by an equation that can be estimated using a defined procedure:

$y = \alpha + \beta X + \mu$ ……...…… 2

If, the technique is multiple regression (more than one explanatory variables) the equation is writing as follows:

$y = \alpha + \sum_{i=1}^{n} \beta i Xi + \mu$ …… 3

$y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \ldots\ldots \beta nXn + \mu$ ……..…… 4

Where, y is the dependent variable (property value), the coefficient α is the minimum value (simply the expected mean value of y) if other explanatory variables become zero, which is the intercept of the graph, β is the slope coefficient represent the mean change/rate of change/ in the variable, X an explanatory variables that affect property values, the subscript i denotes the observation numbers (1,2,3,4,…....), and μ is the residual of which the difference between true value in the observation and the value estimated in the regression (fitted by the model) (Chris and Sotiris, 2010). According to Charis and Sotiris (2010), the reason why the disturbance term or residual (μ) add to the equation is that "even in the general case when there is more than one explanatory variable, some determinants of y will always in practice be omitted from the model. This might for example, arise because the number of influences on y is too large to place in a single model, or because some determinants of y are unobservable or not measurable".

## 2.6 Property valuation

### 2.6.1 Definitions and purposes of property valuation

Property valuation is the heart of all economic activities; and everything we do as an individual or as a group of individuals in business is influenced by the concept of value (Belachew, 2013). Property valuation or appraisal is the act or a process of developing an opinion of the value of an

asset (Appraisal Institute, 2013). Consequently, property valuation is very important for any kind of business activities to estimate the value of the property under different circumstances i.e. selling, buying, bank collateralization, compensation, insurance, taxation etc. According to Maria (2010), property valuation may be defined as a procedure aimed at determining the value of a property. Generally, property valuation means the establishment of a written opinion of a capital value or a rental value of a given property. It is also determining the monetary worth of an asset at a particular point in time for a specific purpose of valuation. The basic goal of property valuation is to provide a measure of the utility derived from the access to and control of property (Belachew, 2013). Both valuation and appraisal used synonymously/interchangeably. An appraisal must be numerically expressed as a specific amount, as a range of numbers, or as a relationship (e.g., not more than, more than, not less than, less than) to a stated amount (Appraisal Institute, 2015).

Property valuation is made because clients need some amounts which are expressed as in terms of money in order to attain a certain purpose. A potential buyer might need advice on how much to pay for a property. A mortgage lender needs to know how much the property is worth to decide a mortgage loan to advance. An expropriator may need an indication of value to decide how much just compensation should be paid to the owner when a property is taken for public use. Generally, the most common purposes of property valuation include sale/purchase, transfer of property rights to another owner, assessment of rental value, estimation of compensation for losses or damages, mortgage purposes, insurance, the court of law, and rent restriction (Appraisal Institute, 2013). Consequently, according to American Society of Appraisers (2012), property valuation is undertaken for one or more of several objectives such as, to determine the value of a property, to estimate the cost of producing or reproducing a property, to estimate the monetary amount of damages to a property and to forecast the monetary earning power of a property.

### 2.6.2 The role of valuers and code of ethics in property valuation

Property valuers/appraisers are those who deal with the special discipline of economics or other related fields associated with preparing and reporting valuations (International valuation standards committee (IVSC), 2003). The main tasks of the valuers are to estimate the value of a particular property for a particular purpose. According to Belachew (2013), the valuer's role, in general, is to advise as what would be the best figure obtained for a given property in the open market at a specific date. Similarly, according to Blackledge (2009b) as cited in Belachew (2013), property valuers before valuing a property are expected to know exactly what type of value they are seeking

to find, for whom to find it and for what purpose this valuation is being required. Also, the valuer expected to identify the various characteristics of the property that affect property value including the external factors that affect its value i.e. social, economic, political and environmental.

Hence, a code of ethical principles of valuation is essential in order to promote ethical practice and to undertake the valuation operations well. Some of the ethical principles are: The valuers should consider his/her client instructions. The appraisers fully to describe what is meant by the particular value which he/she has determined, in order to avoid misunderstandings (American Society of Appraisers, 2012). The appraiser must be competent, continuously monitor and develop his/her theoretical/practical knowledge through education, training, and practice (American Society of Appraisers, 2012). Also, appraisers should avoid giving a false numerical result with carelessness and has every responsibility to avoid giving a false figure (American Society of Appraisers, 2012). Valuers should be confidential to respect the confidentiality of information acquired as a result of professional and business relationships; and not to disclose such information to third parties without proper authority (International Valuation Standards Council (IVSC), 2011). Valuers should have professional behavior to act diligently and to produce work in a timely manner in accordance with applicable legal requirements (International Valuation Standards Council (IVSC), 2011). In addition, appraisers have an obligation to protect the professional reputation of all valuers who practice in accordance with the principles of valuation practice (American Society of Appraisers, 2012). Valuers should be integrity in order, to be honest, and having strong moral principles in professional and business relationships (International Valuation Standards Council (IVSC), 2011). Finally, appraisers must develop and report unbiased analyses, opinions, and conclusions (Appraisal Institute, 2015).

### 2.6.3 Property valuation processes

Property valuation is regarded as a science predominantly because it follows the scientific method of inquiry to develop an opinion of value. The valuation process is a systematic set of producers an appraiser follows to provide answers to a client questions about real property value (Appraisal Institute, 2013), and the process begins when the appraiser enters into an agreement with a client to provide a valuation service. The number of steps followed depends on; the intended use of the assignment, the nature of the property, the scope of work, and the availability of data. Usually, involves the following steps adapted from Appraisal Institute (2013), and modified as follows:

- ✓ *Step one, receiving instructions:* - instructions should clarify the address of the property to be valued, the owner of the property, the purpose of the valuation, the date of valuation and the deadline for the submission of the valuation report.
- ✓ *Step two, identification of the problem:* - it involves the identifications of the following issues; the intended use of the appraisal, type of value and its definition (what is the purpose of the valuation?), the intended users of the property in addition to the client (why does the client want the valuation?), effective date of the opinions, the characteristics of the property that are relevant to the property being valued, and extraordinary assumptions (is the valuation likely to pose special challenges?).
- ✓ *Step three, the scope of work determination:* - after the appraisal problems have been identified, the appraiser can determine the appropriate scope of work. Which includes, all aspects of the valuation process, the approaches to value will be used, and how much data is to be gathered, from what source, from which geographic area, over what time period, the extent of the data verification process, and the extent of property inspection and others.
- ✓ *Step four, planning the appraisal:* - each step in the valuation process should be planned and scheduled i.e. formulating a timetable for carrying out the work. E.g. identifying the valuation team, support staff, and equipment based on the amount and the complexity of the work.
- ✓ *Step five, data collection and description:* - following the identification and determination of the work, the appraiser gathers data: on the market (i.e. neighborhood characteristics, general characteristics of region or city), on the subject property (i.e. characteristics of land use and improvements, legal interest, business asset etc.), and on the comparable properties in the market (comparable property data i.e. legal interest, sales, vacancies, cost and depreciation, income and expenses, capitalization rates, etc.).
- ✓ *Step six, data analysis:* - after the appraiser gathers data relating to the market area, subject property and the comparable properties; the appraiser begins the process of data analysis. The two interrelated forms of analysis are; market analysis (i.e. demand studies, supply studies and marketability studies) and highest and best use analysis (i.e. land as vacant and as improved).
- ✓ *Step seven, land value opinion:* - appraisers often develop an opinion of land value separately. Although a total property value estimate may be derived from the sales comparison or income capitalization approach without separating land and improvement values. But in the cost approach, the value of land must be estimated and stated separately. The appraiser can use

several techniques to obtain an indication of land value i.e. sales comparison, extraction, allocation, subdivision development, land residual, and ground rent capitalization.

- ✓ *Step eight, application of the approaches to value and reconciliation:* - appraisers develop an opinion of value with the three different valuation methods: sales comparison approach (by taking similar properties which are sold recently), income capitalization approach (by anticipating the future benefits of property ownership based on the income generating), and cost approach (by understanding the cost of producing and reproducing). After estimation of value with the three approaches, the final step is reconciliation. Reconciliation occurs within each approach to value, but the final reconciliation occurs at the end of the valuation process.
- ✓ *Step nine, report of defined value:* - a valuation exercise ends with the production of a valuation report by presenting a formal written and a well-bound valuation report to the client.

The following diagram *(figure 4)* shows the valuation process, adapted from (Domninique, 2002).

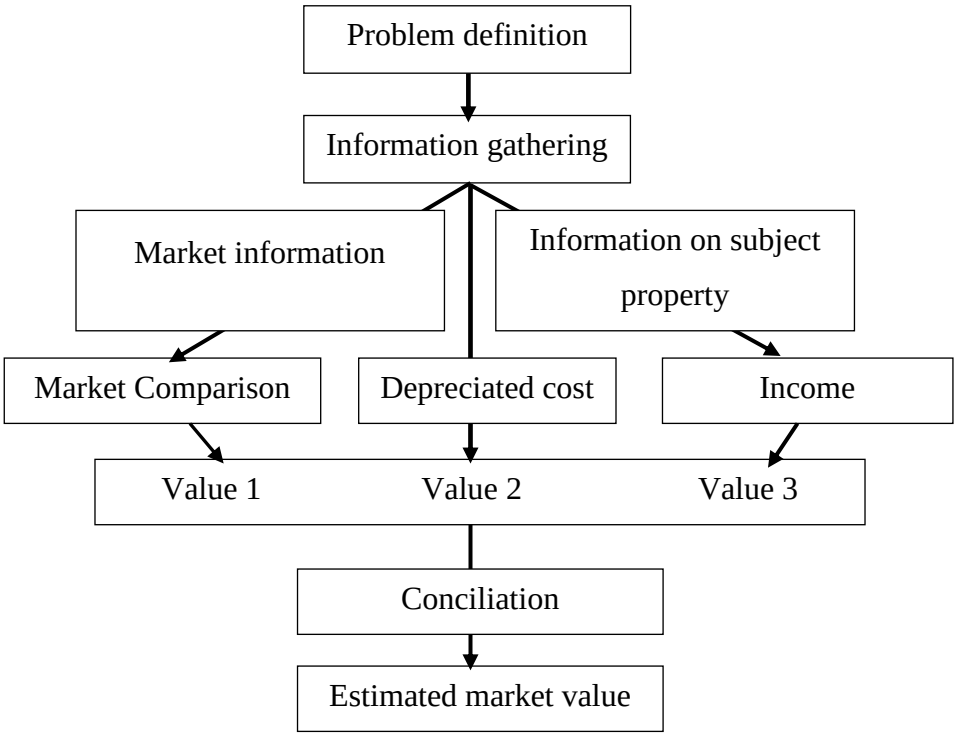



Figure 4: Property valuation process

Source: Adapted from Dominique Fischer, 2002.

## 2.7 Approaches to property valuation

The method of valuation employed in one type of valuation may well prove inappropriate in another type of valuation depending on the type of assets to be valued, the purpose of valuation and data availability (Appraisal Institute, 2013). Valuation of different types of property involves different sources of data that appropriately reflect the market (International valuation standards committee (IVSC), 2003). Conventionally, three valuation techniques have been developed to estimate the market value of a property in the open market at a particular point in time. They are cost approach, sales comparison approach, and income capitalization approach. Each approach of valuation is appropriate to particular circumstances described as below.

### 2.7.1 Cost approach

The cost approach of valuation is based on the determination of the minimum cost of replacing or replicating the service potential provided by the property with modern equivalents. The determination of the cost may be assessed on either the replacement or renewal approach (Michael, 2009). Consequently, the replacement cost approach assesses the costs, including fees of reconstructing the existing building in exactly the same style and materials as it currently exists; whereas the renewal approach is to construct a new building of the same size and to perform the same function as the present structure, but in modern materials and style (Michael, 2009). The cost method is appropriately used to value specialist properties that are seldom sold because there is no clear market demand (Belachew, 2013). According to Vos and Have (1996) and Wyatt (2007) as cited in Belachew (2013), specialist properties include public administration facilities such as prisons, schools, hospitals, town halls, art galleries; and transport infrastructures such as airports, and railway buildings, etc. Because such properties have little or no comparable properties in the market. Likewise, the cost approach of valuation is used on properties for which there is no market, or for which there is insufficient direct comparable market evidence (Michael, 2009).

It is an approach that provides an indication of value using the economic principle that a buyer will pay no more for an asset than the costs to obtain an asset of equal utility, whether by purchase or construction (Royal Institution of Chartered Surveyors (RICS), 2012). Similarly, someone would normally not be justified in paying more for a given property than the cost of acquiring equivalent land and constructing alternative structures, unless undue time and risk are involved (International valuation standards committee (IVSC), 2003). The approach mainly involves the determination of a replacement cost of developments and corresponding depreciation. The method

estimates the replacement value of a property by analyzing the cost of the component of the specific building, by adding the free market value of the land as if vacant to the reconstruction cost of the building, minus depreciation suffered over the years in the operation (Appraisal Institute, 2013). Depreciation is defined as the loss in the value of the property due to its use, life, wear, tear, decay and obsolescence (Appraisal Institute, 2013). Consequently, the method does not actually calculate a market value, instead, it calculates replacement cost for the improvement that has been made to the land (Belachew, 2013). Principally, the cost approach is applied in Ethiopia for collateralization purpose i.e. Commercial Bank of Ethiopia (CBE). Generally, practical applications of the cost method of valuation are described as follows:

Let say: New cost of improvement (NIC) Depreciation (D) Value of land (VL)

Depreciated value of the improvement (DV) = NIC - D

The total value of the property (V) = DV+VL

**Note:** new cost of improvements are estimated based on a present building components/materials value and other related costs to improve the property as new. However, the value of land as if vacant is calculated by comparing to other similar properties sold recently; and its value should be described by per meter square. Depreciation is estimated by age-life method. It assumes that the property to lose its value by a constant amount every year (Appraisal Institute, 2013).

According to Appraisal Institute (2013), the age-life method of estimating physical deterioration involves the following elements; *effective age* of the property (the age of the structure based on the use and care it has received), *total economic life of a building* (the period of time over which a new structure may reasonably be expected to be competitive in the market for the use for which it was designed), and *remaining economic life* (the period of time from the date of appraisal to the expiration of the economic life of the structure). Therefore, depreciation is calculated:

$$\text{Depreciation (D) (\%)} = \frac{\text{Effective age of the structure}}{\text{Total economic life of a structure}} * 100 \quad \text{or}$$

$$\text{Depreciation (D)} = \frac{\text{Effective age of the structure}}{\text{Total economic life of a structure}} * \text{New cost of improvement for the structure}$$

Whereas: Total economic life = effective age + remaining economic life

### 2.7.2 Sales comparison approach

Sales comparison approach of valuation is undertaking based on making comparisons between the property being valued (the subject property) and similar properties (comparable properties) sold recently, in order to determine the market value of the property being valued (Appraisal Institute, 2013). The method is based on comparing 'like with like'. If there is the more dissimilarity between the subject property and comparable properties, the more adjustments will have to be made in order to take account of the dissimilarities between them. It provides an indication of value by comparing the subject asset with similar assets for which price information is available (Royal Institution of Chartered Surveyors (RICS), 2012). Also, International Valuation Standards Committee (IVSC) (2003), the comparative approach of valuation considers sales of similar properties that have been transacted in the open market. It is the most preferred method of valuation, because it may be used for the valuation of all forms of properties so long as comparable sales data for the property being valued is readily available. Usually, it is not applied to special purpose properties because a few similar properties may be sold in a given market (Belachew, 2013). The approach is certainly the most immediate approach to apply for the valuation of residential properties (Domninique, 2002).

In general, Belachew (2013), stated the concepts of the approach in the following way:

*'In the sales comparison approach, transaction prices of highly comparable and recently sold properties are used to estimate the market value of the subject property. The economic rationale of the method is that a knowledgeable and prudent person would not pay more for a property than other persons have recently paid for comparable properties given that the general market conditions are the same. If meanwhile, the general market conditions have changed, the persons are only willing to pay comparable prices adjusted by the general price level for properties'.*

According to Michael (2009), the three main requirements of comparable properties are (i) similar property type to the subject, (ii) similar location to the subject and (iii) evidence obtained is recent and reflects current market conditions. The degree of similarities and differences between the subject property and the comparable properties are usually adjusted by the following comparison elements: property rights conveyed, conditions of sale, market conditions (time), financing term, location, physical characteristics, legal characteristics, economic characteristics, use (zoning) etc. (Appraisal Institute, 2013). Accordingly, dollar or percentage adjustments are then applied to the known sale price of each comparable property to derive an indicated value for the subject property;

also qualitative analysis techniques may also be applied for the elements of comparison for which quantitative adjustments cannot be developed (Appraisal Institute, 2013).

According to Domninique (2002), steps and conditions required in the sales comparison approach is described below:

*'Identification of the subject property characteristics, clear understanding of the transaction conditions, identification of the immediate relevant sub-market, documentation of all recent transactions that occurred in this relevant sub-market, selection of the best sample of comparable properties, adjusting prices of observed transactions to take into account the subject property characteristics and weighting of the required adjustments'.*

### 2.7.3 Income capitalization approach

Income approach to valuation is mostly applicable for income producing properties. It is based on the assumption that potential buyers will pay no more for the subject property than an equally desirable substitute investment that offers the same return and risk as the subject property. Thus, the income approach is mainly applied in calculating the market value of properties which earn or might earn income (Maria, 2010). It considers the subject property as an investment and its value is on the rent it will produce for the owner with the anticipation of future benefits. This approach provides an indication of value by converting future cash flows to a single current capital value (Royal Institution of Chartered Surveyors (RICS), 2012). The process of converting future income flows into present-day capital is called capitalization. According to International Valuation Standards Committee (IVSC) (2003), the income approach considers income and expense data relating to the property being valued and estimates value through a capitalization process.

Capitalization is the process of summing up future benefits each having been discounted to the present at an appropriate discount rate or capitalization rate (Appraisal Institute, 2013). There are two methods of income capitalization; direct capitalization (the relationship between one year income and value is reflected in either a capitalization rate or an income multiplier) and yield capitalization (several years forecast income at the end of a designated period are converted to present value using a yield rate) (Appraisal Institute, 2013). Like other approaches to valuation, the income approach of valuation needs an extensive market data. The specific data required in the income capitalization approach might include the properties gross income, the expected reduction caused by vacancy and collection loss, the anticipated annual operating expenses, the patterns and

duration of the property income stream (Appraisal Institute, 2013). After the property income and expenses are estimated, the income streams are capitalized into the present value by discounting.

Generally, the practical applications of the income method of valuation using a direct capitalization rate method are described as follows:

The following data are important:

- Potential gross income (PGI): the highest revenue obtained from the property.
- Vacancies (Vac): the expected reduction caused by vacancy and collection loss.
- Operating expense (OE): the total sum of expense (direct and indirect); includes maintenance, insurance, management, consultancy fee etc.

First, determine the Net Operating Income (NOI) = Effective Gross Income (EGI) – Operating Expenses (OE).

- Effective Gross Income (EGI) = Potential Gross Income (PGI) - Vacancies/bad debts (Vac).

Then, determine capitalization rate (cap rate) = Net Operating Income / Purchase Price

- Capitalization rate (cap rate) can be determined from other similar properties in the neighborhood which are sold recently.
- The net operating income and the purchase price used to determine the capitalization rate is taken from other properties in the neighborhood which are sold recently.

Finally, the net operating income of the subject property to be valued and capitalization rate from other properties are used to determine the true value of the subject property.

True Value = Net Operating Income / Capitalization rate (%)

- *Note:* the net operating income which is used to determine the value of the property is, taken from one of the expected income in the coming years (mostly the second year) in the operation period, not the previous income.

Generally, the income approach of valuation assumed that; if there is the higher the net income earnings are, there will be the higher the property value.

### 2.7.4 Final reconciliation of value

The last phase of any valuation assignment in which two or more value indications from different approaches derived from market data are resolved into a final value opinion through reconciliation process (Appraisal Institute, 2013). It is a common usage for property valuers to value a property

with more than one valuation method i.e. cost, sales comparison and income methods based on the available information. If the valuer used more than one method, then he/she has to make a reconciliation to derive a final estimate of the market value (Belachew, 2013). Therefore, the final opinion of value is derived from after reconciliation of the approaches that have been used. The nature of reconciliation depends on the appraisal problem, the approaches that have been used, and the reliability and adequacy of the data used in each approach of valuation (Appraisal Institute, 2013). The decisions during the reconciliation process depend on the valuer's judgment based on the quality of the data used in each approach. The approach which has been a good quality of data than the other approaches would take a higher percent in the reconciliation pace.

### 2.8 Lessons learned from the literature

Land use is dynamic and change in response to population and economic growth, public and private decision, market and governmental actions. Consequently, urban areas are continually subject to changes in use and pattern, because as social and economic factors making such changes with the resultant effect on residential property values. There are various types of real properties classified based on their existing use. Among them, residential property is one of the classifications; which is the subject of this study. It is characterized by parcels with/without buildings which are used for/probably will be used for residential purposes i.e. apartment buildings (multi-family), single-story housing units, multi-story housing units, condominium buildings etc.

Hence, the property value is the price most likely to be concluded by the buyers and sellers of a property that is available for purchase in the open market. In property valuation practice, a value is expressed as a market value. It can be defined as the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in the arm length transaction after proper marketing in which the parties had each acted knowledgeably, prudently, and without compulsion. Conventionally, three valuation techniques have been developed to estimate the market value of a property in the open market at a particular point in time. They are cost approach, sales comparison approach, and income capitalization approach. Each approach to valuation has an objective to estimate the market value of a property.

Therefore, different pieces of empirical evidence indicated that the determinant factors of urban land use changes are greatly different from place to place. Most of the determinant factors for urban land use changes are directly affected both rental and capital values of residential properties.

Some of the factors identified from the literature are increase in population, intra-urban migration, investment potential (demand) and supply, level of development in the area, location, safety and security, topography, land use regulations, infrastructures development, economic activities in the neighborhood (agglomeration of business activities), complementarity of activities (land use compatibility), availability of public utilities and amenities, construction of roads, accessibility to transportation, and environment quality of the neighborhood.

As a result, according to pieces of different empirical evidence, most of the factors for urban land use change that affects residential property values have a positive impact on both rental and capital values residential properties. For example, most of the studies in Nigeria such as a study on Kaduna metropolis, Taraba state, metropolitan Lagos, and Abeokuta Ogun state discovered that there have been remarkable changes in land use pattern from farmland to residential and other urban uses or from residential to commercial uses, this had led to corresponding increasing values of both residential and non-residential properties.

Furthermore, the methodology adopted to assess the impacts of land use change on property value particularly residential value is mostly similar .i.e. questioners, interview and observation (physical inspection) for primary data; and review of relevant literature for secondary data. The questioners were also analyzed by using model and simple descriptive statistics particularly frequencies and percentages. In addition, the analysis of variation technique and relative importance index as a ranking model are also employed to identify the most significant determinants among others.

## 2.9 Conceptual definition of some terminologies

*Urban land use:* it shows everything that makes up a city which indicates different uses and activities on the land; includes urban farm, residential, commercial, service, industrial etc.

*Urban land use change:* can be defined as the changing of the activities of the land from one type of use to another; for example from farmlands to different urban activities such as residential, commercial, and industrial as well as other related urban services.

*Residential property:* is defined as buildings/structures which are used for residential purposes. For example condominiums, apartment buildings, single story and multi-story housing units etc. If a small part of a house is used for a commercial use and the house is in a residential area, the property is called residential.

*Property value:* is the amount for which a property should exchange or rent in the open market between a willing buyer and a willing seller without any special relationship between them which might affects the value in the open market. Meaning, the seller is interested to sell the property of the best price in the open market and a buyer also inspired to purchase based on the current market.

*Impact:* is the powerful influence of a certain action on the other situation, it is the direct output of an activity at a macro level. It might be positive or negative.

*Property valuation:* is the establishment of a written opinion of a capital/a rental value of a given property at a particular point in time for a specific purpose of valuation.

*Land use regulation:* is a directive used by local authorities to indicate the types of land uses allowable in a specific location and shows a specific site/property to be developed in accordance with the urban plan. Examples of land use regulations are zoning, subdivision and site regulations.

*Demand and supply:* demand is the consumer's need for the number of properties in which people are ready and able to buy or rent at a given time for a given price. Whereas supply is the number of properties supplied or available to consumers for use or purchase at any specified price.

*Physical infrastructure/utility:* physical infrastructure/utility is defined as the hard components that are mainly placed under and above the ground that provide services to the public. Which includes water supply, electricity, telephone, drainage, and sewerage line.

*Public services:* are facilities provided by the government or the local authority to a particular community living within its vicinity in order to benefit all the people. Such as health services, educational services, administrative services, waste dumping sites etc.

*Road and Transportation:* the road is a circulation primary used for the movement of vehicular and non-vehicular traffics from one place to another. Whereas Transportation is the circulatory system of a city which provides the means by which we can move from one place to another.

*Topography:* is the nature of the physical characteristics of the landscape i.e. flat, steep, gentle etc.

*Neighborhood physical quality:* is the appearance of the physical and environmental conditions of the locality. Which includes the physical layout/site design of the settlement, road connectivity, and accessibility, environmental pollution, waste management system etc.

*Safety and security:* it can be defined as the quality of the neighborhood protected or safe from harm, danger, criminal acts or other negative externalities.

*Agglomeration of business activities:* is the complementarity and mix of different urban activities. Complementarity is defined as the harmonization, organization, and compatibility of different land use activities in the neighborhood, without any conflict among various urban functions. For example, residence and shops, residence and green developments etc. Whereas a mix of different urban activities shows the availability, accumulation, and distributions of different social, environmental, economic, institutional, and recreational activities in one area. Example shops, cafes, basic infrastructures and services financial institutions, public places, business centers, transportation etc.

# CHAPTER THREE: FINDINGS OF THE STUDY

## Introduction

The foregoing chapters outlined the overall context of the research, the theoretical and the empirical pieces of evidence about the research objective. This chapter is also the extension of the previous chapters and presented the research findings and discussions covering the nature of land use change, the determinants of land use change that affect residential property values and the impacts of the change on residential property values as well as the estimation of the market value of affected residential properties in the date of valuation in the study area.

## 3.1 Urban land use change in the case study area

### 3.1.1 Trends in land use change

Addis Ababa city is undergoing a substantial level of change in land use from agricultural farmlands into different urban uses in the past few decades especially in the expansion of the city as a result of urbanization, population growth, and economic development. The case study area named at 'CMC-Safari' which is located in Bole sub-city, Addis Ababa is one of the expansion areas of the city, in which land use is dramatically changed in the past 15 years from farmland to different urban related functions. According to satellite images taken from Google Earth in different time periods (years), urban development in the study area has been started in 2004 after the construction of internal access roads by following the major road which connects CMC and Summit through Safari (figure 5, right). Based on the spatial data from Bole sub-city urban planning office and spatial analysis made by the researcher, almost 93% (69.7 hectares) of the area was farmland before 2004 and the rest 7% (5.3 hectares) was used for residence for those farmers who are located near to the river bank (figure 5, left).

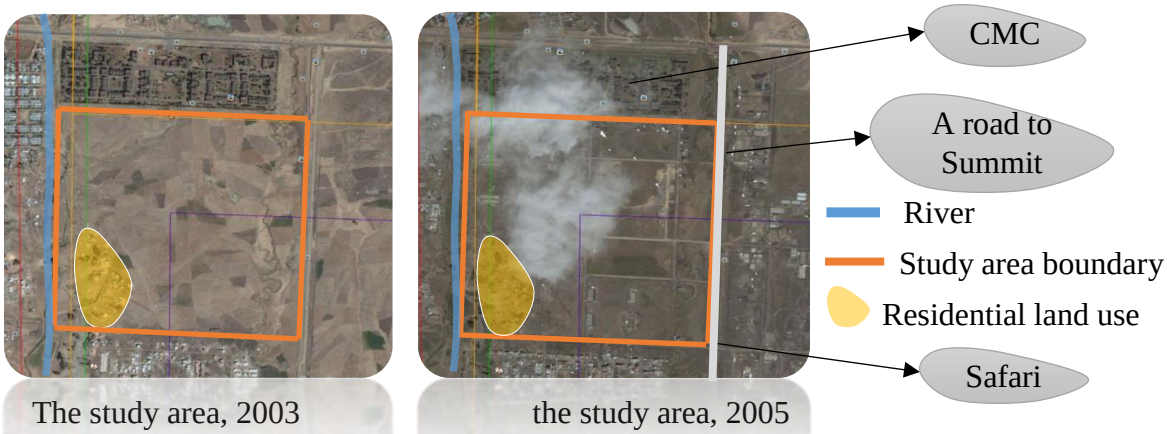



Figure 5: Satellite image of the study area, 2003 and 2005

The satellite image in 2008 (figure 6, left) however indicated that built-up area of the study vicinity has increased with different urban functions and services. According to the interviews made with key informants from Brokers and urban planners, the master plan of Addis Ababa (2002) facilitated the horizontal expansion of the city that resulted in land use changes of the study area. Thus, after the construction of access roads in the study area in 2004 & 2005, different urban development activities have occurred. During that period the land use activity was predominantly residential in nature. Consequently, in 2013 as the satellite image indicated (figure 6, right), the built up area has significantly increased than 2008. Almost all of the respondents (residents, planers and brokers) agreed that the availabilities of a mix of different activities are increasing from time to time when compared to the previous land use. But still residential land use is the dominant land use.

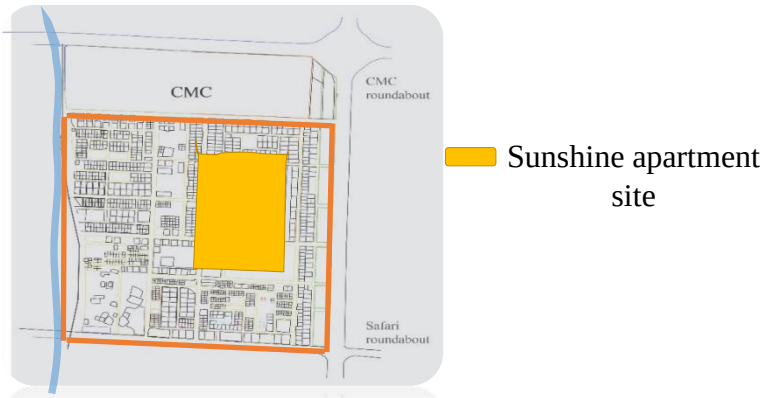
Figure 6: Satellite image of the study area, 2008 and 2013

Currently, based on the parceled map of the case study area in 2016 (obtained from Bole Sub City Urban Planning Office) and field observation by the researcher in 2018, almost 98% (73.5 hectares) of the land is used for urban functions including both built-up areas and non-built up areas (open spaces such as green spaces and playgrounds). The remaining 2% (1.5 hectares) of land is undeveloped open land located near to the river bank *(figure 7).* Now, according to secondary documents of GIS & AutoCAD files from Bole sub-city Urban Planning Office and direct field observation made by the researcher on May 2018 on the study area, about 1,042 plots of land is parceled and occupied by different owners with different land use activities *(figure 8*). This number doesn't include parcels of three blocks occupied by sunshine construction company, which is now constructing residential apartment buildings on the site. Currently, the dominant land use in the study area is residential. According to key informants (urban planners and residents), one of the reasons for the dominance of residential land use in the area is due to the 2002's Addis

Ababa Master Plan, because the area is zoned/regulated for mixed residence *(figure 9).* Sunshine construction plays a major role in land use change in the study area by constructing apartment buildings at 15 hectares of land in order to meet the housing demand of city residents *(figure 8).*

Figure 7: Satellite image of the study area, 2017

Open land




Source: Bole sub-city Urban Planning Office (2016)

Figure 8: Parceled map of the study area, 2016

### 3.1.2 Existing land uses in the study area

According to the spatial analysis made by the researcher using GIS and AutoCAD software's, as well as information obtained from the interviews, questionnaires and observation made in the study area; the findings show that due to the 2002's Addis Ababa Master Plan provisions for the city expansion area, the construction of internal access roads in the study area, and housing demand by the growing populations attracted people started to live in the area, resulted in the conversion of farmlands into different urban uses. This attraction also increased the number of households in the area in the past one and half decade. This increasing of households and conversion of farmlands into urban functions in fact increased demand for the neighborhood that resulted in land use changes. In fact, it has been a customarily trend for residents to purchase and lease agricultural land from farmers and the city administration for development of residential, commercial and other urban amenities. There are also number of (153 parcels) under-construction in the study area. as per the interviews made with owners (also backed by observation) around 91% (139 parcels) are designed and used for residential purpose, while 1.3% (2 parcels) are for services, and the remaining 7.8% (12 parcels) are for commercial and mixed-use buildings.

Therefore, the existing land use in the study area CMC-Safari is predominantly residential in nature with some commercial and mixed uses along the major roads. Generally, now the neighborhood is characterized by residential dominated mixed development area. The major land use activities

in the study area is *residential* (single-family single-story, single-family multi-story and multi-family apartment buildings), *mixed-use* (for both residential and commercial purpose), *commercial* properties (for banks, supermarkets, offices, cafes and restaurants, shops), *social services* (both private and public schools and clinics), *green developments and open communal spaces* used for recreational purpose (such as green areas and playgrounds), administration uses (such as court office) and *small-scale manufacturing* activities such as hollow block manufacturing and metal workshop. However, according to the interviews made with the owners and physical inspection of the properties made by the researcher most of mixed-use and commercial properties are purposely built for residential use, but now which are using for commercial activities. They are also located along the two major asphalt roads; those are the major road from CMC roundabout to Summit through Safari roundabout and the road from Safari roundabout to Sahalite Mihret church. Along these two major roads, almost all properties are used for business *(figure 11).*

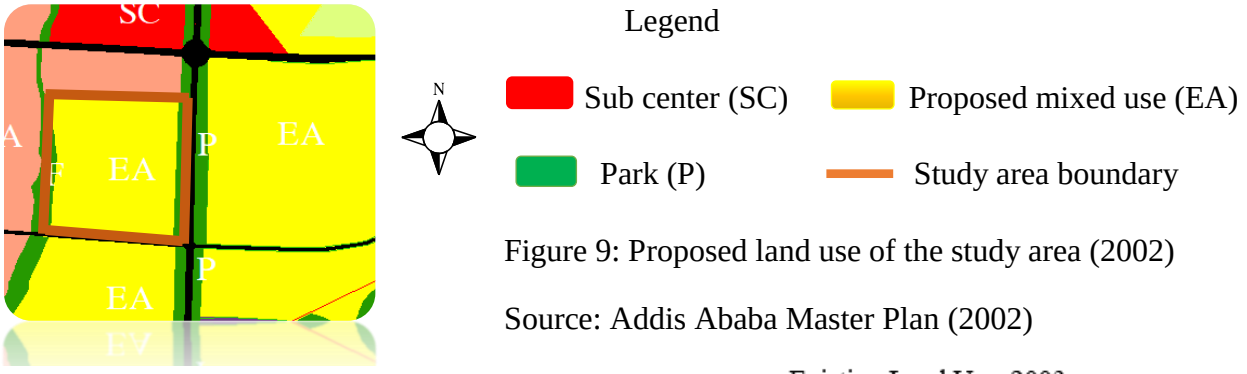



Figure 9: Proposed land use of the study area (2002)

Source: Addis Ababa Master Plan (2002)

Spatial data comparative analysis conducted between the year 2003 (figure 10) and 2018 (figure 11) indicated that there are massive changes in land use from farmland to different urban uses. In 2003, 93% (69.7 hectares) was farmland and the rest 7% (5.3 hectares) was used as a residence for those farmers. But now, in 2018, almost 98% (73.5 hectares) of the land is used for urban uses and the remaining 2% (1.5 hectares) is undeveloped open land located near to the river bank.

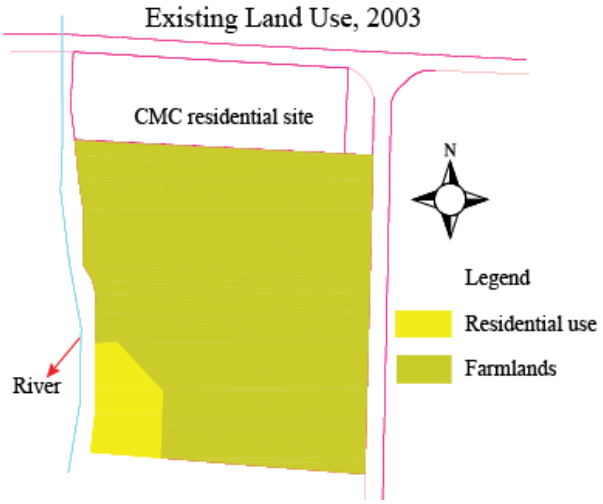



Figure 10: Existing land use of the study area (2003)

Source: Satellite image, 2003 and Bole sub-city Urban Planning Office

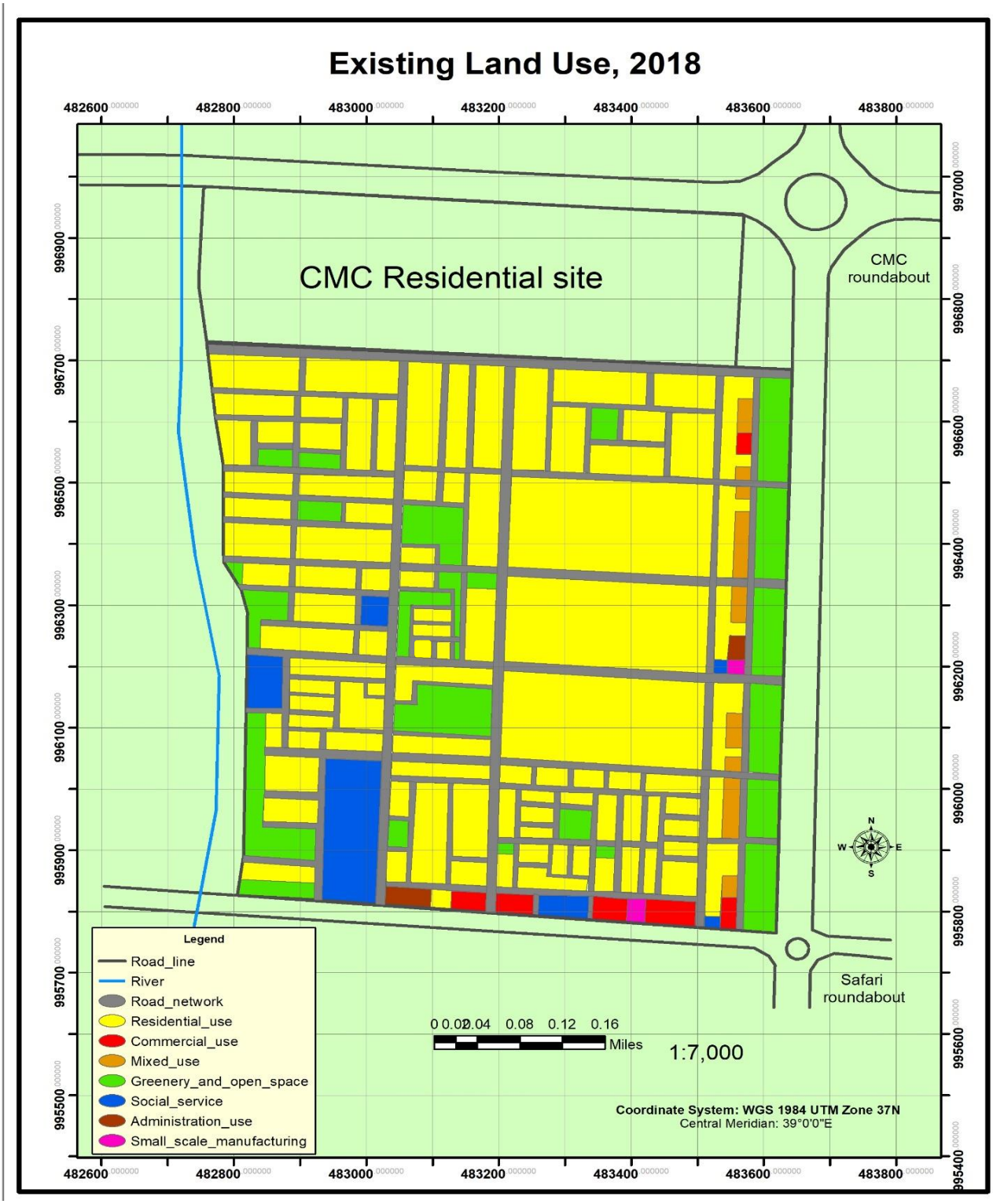



Figure 11: Existing land use of the study area in 2018

Source: Field survey, 2018

### 3.1.3 Changes in land use in the study area

Similar to case study literature from Nigeria, almost all the respondents (also supported by spatial analysis) (figure 10 and 11) agreed that there have been dramatic changes in land use in the last 15 years in the study area. The following *(table 2)* shows the changes in land use in the study area.

Table 2: Land use change in the study area in the last 15 years

| No. | Land use change in the study area | Coverage ($m^2$) | Percentage (%) |
|---|---|---|---|
| A | Farmland to: | | |
| 1. | Urban roads | 167,076.03 | 24.00 |
| 2. | Residential | 411,375.29 | 59.03 |
| 3. | Mixed | 11,402.40 | 1.63 |
| 4. | Commercial | 10,656.19 | 1.50 |
| 5. | Social service | 10,191.13 | 1.40 |
| 6. | Greenery and open space | 81,426.77 | 11.70 |
| 7. | Administration | 3,061.23 | 0.44 |
| 8. | Small-scale manufacturing | 1,653.37 | 0.30 |
| | **Sub total** | **696,842.43** | **100** |
| B | Residential to: | | |
| 9. | Social service | 19,403.83 | 36.50 |
| 10. | Greenery and open space | 13,384.62 | 25.16 |
| 11. | Urban roads | 6,971.90 | 13.10 |
| 12. | No change (residential to residential) | 13,433.20 | 25.24 |
| | **Sub total** | **53,193.56** | **100** |

Source: own computation based on field survey, 2018

As depicted in the above table, two major changes have been observed in the study area in the last one and half decade: from farmland to other functions and from residential to other uses except farmland. As to farmland to others uses, the foremost transformation detected was from farmland to residential (59%) followed by farmland to greenery and open spaces (12%). The other is from residential to other uses which has been dominated by from old existing residential use to social service (36.5%) and to greenery and open space (25%).

However, according to the respondents (brokers, urban planners and residents), most of the changes and its rate is increasing after 2010 because of different reasons. First, some access roads are constructed which connects the main road in to the inner part of the site. Second, one major gravel road (from Safari roundabout to Sahalite Mehirt) was upgraded into asphalt. Third, sunshine construction had started constructing housing units (apartment buildings). In addition, the positive externality effect of Light Rail Transit (LRT) also plays an eminent role.

### 3.2 Factors of land use change that affect residential property values in the study area

Results of the findings depict that various land use change factors affect residential property values in the study area. The Addis Ababa (case study area) situation is not too different from others because most of which being detected by the literature elsewhere in the globe. The major factors observed include:

- Road construction and transport access
- Physical infrastructure/utility development
- Safety and security
- Housing demand
- Development of public services and urban amenities
- The physical quality of the neighborhood
- Land use regulation/supply of land by the city master plan of Addis Ababa
- Agglomeration of business activities and
- Physical nature/topography.

The most significant factors identified, inter alia, were found to be housing demand by the growing population, road construction and expansion of economic activities in the neighborhood in recent years. According to brokers and residents, the area has been growing rapidly in recent years which created high rental and capital value of properties in the neighborhood. This is mainly due to road construction, creation of transportation and proliferation of different business activities across the locality. In addition, sunshine real estate company also plays a major role for the increase of values of residential properties, primarily because it is constructing a huge number of apartment buildings on 15 hectares of land in the study area *(figure 12)*. According to the respondents (brokers and residents), another most important factors for residential property value change in the study area is broker's interference to the property market (for instance, most of the respondents confirmed

that, if for example, let say one residential property is recently sold 4 million birr in the locality, after that it is very challenging to buy residential properties with a value of less than 4 million birr throughout the neighborhood. Because brokers use this value as a bench-mark without any information about the transaction conditions), social class influx (arrival of high income social groups to the study area), and the role of financial institutions (banks) in terms of injecting sizable loan using residential properties as collateral. Property-specific factor is also another determinant i.e. partition/number of rooms/ and opening orientations of windows and doors. So, the study result shows the above factors causes for the appreciation of residential property values in the study area.

Figure 12: Sunshine apartments in the study area (own photo, May 2018)

*Table 3* (beneath) shows the Relative Importance Index (RII) analysis of determinants of land use change that affected residential property values in the study area. Thus, the RII result indicates that housing demand by the growing population, road construction & transport access, agglomeration of different business activities and utility development are the most significant factors for land use change that affected residential property values in the study area (CMC-Safari).

Table 3: Factors of land use change that affected residential property values at CMC-Safari

| Variables | It is a cause for land use change | | | | | It has brought corresponding change in residential property values | | | | | Total no. of respondents | Weight | RII | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | |
| Road construction & transport access | 0 | 0 | 4 | 18 | 28 | 0 | 0 | 0 | 26 | 24 | 50 | 224 | 0.896 | 2 |
| Infrastructure/utility development | 0 | 0 | 8 | 18 | 24 | 0 | 0 | 8 | 26 | 16 | 50 | 208 | 0.832 | 4 |
| Safety and security | 3 | 9 | 6 | 19 | 13 | 0 | 0 | 12 | 20 | 18 | 50 | 206 | 0.824 | 5 |
| Housing demand | 0 | 0 | 0 | 26 | 24 | 0 | 0 | 0 | 11 | 39 | 50 | 239 | 0.956 | 1 |
| Public service & urban amenities | 0 | 11 | 9 | 23 | 7 | 0 | 11 | 14 | 17 | 8 | 50 | 172 | 0.688 | 9 |
| Agglomeration of business activities | 0 | 2 | 5 | 18 | 25 | 0 | 2 | 3 | 26 | 19 | 50 | 212 | 0.848 | 3 |
| Physical quality of the neighborhood | 0 | 8 | 18 | 15 | 9 | 0 | 6 | 13 | 19 | 12 | 50 | 187 | 0.748 | 7 |
| Land use regulation/supply of land | 0 | 0 | 7 | 32 | 11 | 0 | 0 | 9 | 31 | 10 | 50 | 201 | 0.804 | 6 |
| Topography | 0 | 10 | 15 | 13 | 12 | 0 | 10 | 14 | 8 | 18 | 50 | 184 | 0.736 | 8 |

Source: Field survey, 2018 and computed with Microsoft Excel

The analysis in *table 3* shows that housing demand by the growing populations has the highest score with the Relative Importance Index of 0.956 (most respondents agreed) which is the most responsible factor for land use change that affected residential property values in the study area. Road construction and transport access were found to be the second most important factor as RII value indicated (0.896), with agglomeration of business activities and utility development being considered as the most important factors ranked 3rd and 4th respectively. The least factor tested by respondents (ranked 9th) is public services and urban amenities at RII value of 0.688. Generally, all the variables identified from the literature are significantly important factors because the RII values for all variables were found to be above the average (0.500).

As discussed in the methodology part of this study, Relative Importance Index (RII) is a type of analysis technique that shows the relative importance of predictors (independent variables) when the independent variables are correlated with each other. For this study, it also shows which variable is the most important than others based on a five-point scale (1- strongly disagree, 2- disagree, 3- neither, 4- agree and 5 – strongly agree) responses of respondents. Therefore, in the calculation of Relative Importance Index (RII), the formula below was used. Adopted from Johnson and LeBreton (2004) as cited in Somiah et al. (2015).

$$\mathrm{RII} = \frac{\sum W}{A * N}$$

Where, W – weighing given to each statement by respondents and ranges from 1 to 5; A – higher response integer (5); and N – total number of respondents.

Based on the above formula, the estimation of RII value for this study is conducted with Microsoft Excel application. The following sample shows the estimation of RII value based on *table 3* (*for example road construction and transport access)*: yet, the calculation procedure is similar for all other variables.

From table 3, the higher response integer (A) is 5. Total number of respondents (N) is 50; =0+0+0+26+24. Weight (W) is 224; =SUM(0*1+0*2+0*3+26*4+24*5). The RII value is 0.896; =224/(5*50). Finally, it is ranked the second determinant factor based on the RII value.

### 3.2.1 Housing demand

The most important factor for land use change that influenced residential properties value in the study area is the increase in population number and the pursued housing demand. Almost all respondents agreed with this fact and ranked first as the Relative Importance Index (RII) value

(0.956) (*table 3)*. Real property has no value if it is not scarce and if it not effectively demanded (Ajibola et al., 2012). Literature has established that population migration leads to housing demand that directly affected residential property values (Emmanuel and Wan Zahari, 2016; Adebayo, 2009). This study also affirmed this fact. People are migrating to the capital city Addis Ababa from all corners of the country Ethiopia in search of good life and job opportunities. These lead to urbanization; economic development and increase in population number in the city that resulted in the rise for housing demand and residential property values.

### 3.2.2 Road construction and transport access

The second most important factor that influenced residential properties value is the increasing of accessibility i.e. road construction & transportation, as indicated in the RII value (0.896) (*table 3*). According to the resident's interview, especially along the two major asphalt roads, land use is changing significantly from farmland or residential to different urban activities. This changing of land use directly influences both rental & sale values of residential properties in the locality. This fact is also tested by others work (Oruonye, 2014; Adegunle et al., 2016). Thus, a residential property located near to the main road has command high value because of their proximity to the major road and closeness to different business activities along the main road. However, the values of residential properties is decreasing where it is far from the main roads, apparently witnessing how location plays a significant role in the determination of residential property values (Ajibola et al., 2012). Consequently, in the study area residential properties near to the main road are highly sensitive to conversion into different commercial uses/services i.e. clinics, shops, cafes etc.

### 3.2.3 Agglomeration of business activities

The availability complementarity and mix of different urban activities in the neighborhood are increasing from time to time in recent years (example: social services, banks, shops, cafes, playgrounds, and others). As the respondents indicated that, mixes of urban activities located in the neighborhood are compatible with each other. These accumulations of business are also another most important factors for land use change that directly affected both rental and sale values of residential properties. As per the literature portrayed by Adegunle et al. (2016) works, this study also found to be as the RII value (0.848), depicted in *table 3* most respondents believe that distribution of business activities in the study area are factors for land use change that increasing residential property values.

### 3.2.4 Physical infrastructure/utility and public service development

According to Adebayo (2009), physical structures/facilities developed or acquired by public agencies enhance governmental functions and facilitate the achievement of common social and economic objectives. The major publicly built amenities available in the study area include electricity, water supply, telecommunication, sewerage line, drainage line, and waste collection site. This availability of infrastructure attracts residents and lead to the increase in residential property values. Factors of physical infrastructure/utility development are considered by some respondents as the obtained RII value (0.832) specifies (*table 3*). Similar to this study, the factor of utility development is tested by others (Olayinka et al., 2013; Adegunle et al., 2016; Pierre, 2014) works somewhere else in the globe.

However, according to the respondents, public services and urban amenities are the least determinant factors for land use change that affected residential property values in the study area (RII value of 0.688) as plainly indicated in *table 3*. This is probably because most of the residents are in the high-income category and they may not give much prominence about availability of public services.

### 3.2.5 Safety and security

Safety and security can be defined as the quality of the neighborhood protected or safe from harm, danger, criminal acts or other negative externalities. The study area CMC-Safari is characterized by safe and secured neighborhood because of the residents are categorized into high income groups and they can protect themselves from danger and negative externalities by using quality community fences, community guards and other means of protections. Survey respondents argued that this results the area is more safe and secured and has to be high value (as the RII value of 0.824 in *table 3*). Some respondents argued that there are social class influxes (high-income residents) in the study area that resulted in the escalation of residential property values. Similar to this study, other studies are also confirmed this (Emmanuel and Wan Zahari, 2016; Adegunle et al., 2016; Olayinka et al., 2013).

### 3.2.6 Physical quality of the neighborhood

Neighborhood physical quality is the appearance of the physical and environmental conditions of the locality. Which includes the physical layout/site design of the settlement, road connectivity, and accessibility, environmental pollution, waste management system etc. The physical quality of

the neighborhood CMC-Safari is characterized by good quality and well planned settlement (good site design, street network, quality building typologies, clean environment etc.) that resulted in increases residential property values in the locality. This is also affirmed by (Oruonye, 2014) work. Physical quality of the neighborhood is one of the factors that created the neighborhood has to be more demanded and commanded high residential property value (both sale and rental) as the RII value of 0.748, which in fact are ranked 7$^{th}$ , shown in *table 3*.

#### 3.2.7 Topography

Topography is defined as the nature of the physical characteristics of the landscape i.e. flat, steep, gentle etc. the topography of the study area is characterized by a gentle slope which is suitable for any kind of urban development. According to the survey respondents, as the RII value of 0.736 *(table 3)* and other study elsewhere in the globe by Oruonye (2014), depicted that topography is among one of the determinants of urban land use change that affected residential property values.

#### 3.2.8 Availability/supply of land and land use regulation

Availability of land in the study area is one of the major causes of land use change by attracting residents to the neighborhood. According to the key informants (planers, residents and valuators), provision of proposed land by the city master plan of Addis Ababa (2002) and the increasing population number in the city makes the area highly demanded. This increase of population to the study area which is facilitated by the master plan of Addis Ababa on the available farmland directly affected residential property values. Some of the respondents have confirmed this fact with RII value 0.804 ranked 6$^{th}$ out of nine *(table 3).* This is also portrayed by Adegunle et al. (2016) and Adebayo (2009) works elsewhere in the globe.

### 3.3 The impact of urban land use change on residential property value in the study area

#### 3.3.1 Changes in residential property values over time

Generally, land use change in the study area is seen positively affecting (increasing) residential property values at CMC-Safari. The following analysis below plainly shows an increasing trend of values of both multi-family (apartment) and single-family (single-story and multi-story) residential properties (both rental and sale/capital values) in the study area (CMC-Safari) in the last four years.

Table 4: Summary of average rental and capital values of residential properties (apartments)

| Type of residence | 2014 | | 2016 | | 2018 | |
|---|---|---|---|---|---|---|
| | Rent (Birr) | Sale (Birr) | Rent (Birr) | Sale (Birr) | Rent (Birr) | Sale (Birr) |
| 2 bed rooms | 5,000 | 1.375 million | 7,500 | 1.950 million | 9,625 | 2.625 million |
| 3 bed rooms | 6,000 | 1.525 million | 8,625 | 2.325 million | 11,750 | 3.450 million |

Source: Field survey, 2018

As shown in *table 4*, the rental values of two bedrooms are increases in the last four years in the study area. The average rental value was 5,000 Birr (during 2014) which increased to 9,625 Birr (in 2018). Similar to the two bedrooms rental value of three bedrooms also increased in the last four years with the average rental values rose from 6,000 Birr in 2014 to 11,750 Birr. Similarly, *table 4* indicated, sale values of two and three bedrooms are growing in the last four years. The information gathered clearly illustrates that the average sale value of two and three bedroom apartments have increased by a staggering 91% (from 1.375 million to 2.625 million Birr) and 126% (1.525 million to 3.450 million Birr), respectively in the considered 2014 to 2018 period. Consequently, the higher percentage increment for three bedrooms than two bedrooms is due to the higher demand of three bedroom apartments in the study area.

The fact one comprehends from the table (4) is that rental values for both two and three bedroom apartments have exhibited an average annual growth rate of 23.12% and 23.96%, respectively between 2014 and 2018. Similarly, sale values escalated by 22.72% (for two bedrooms) and 31.56% (for three bedrooms) in the considered period. According to the brokers and residents, the main cause for the higher differences (rise) in rental value (between 2014 and 2018) is due to construction of quality apartments by Sunshine real-estate, the regularizations of internal access roads throughout the site, intervention of brokers to the market and the increasing of provisions of utilities in the locality. Also, increasing of housing demand plays an eminent role for the escalation of both rental and capital values of apartments in the study area. In theory, the construction of access roads and the provision of infrastructures has a positive effect on property values (Berke et al., 2006). Similarly, empirical evidences of other countries depicted this affirmation (Oruonye, 2014; Adebayo, 2009; Pierre, 2014; Olayinka et al., 2013; Adegunle et al., 2016) works, especially from Nigeria and Rwanda cases.

Table 5: Summary of average rental values of single-family residential properties

| Types of residences | 2014 | 2016 | 2018 |
|---|---|---|---|
| | Rent (Birr) | Rent (Birr) | Rent (Birr) |
| G+0 (150 $m^2$) | 7,825 | 8,875 | 12,250 |
| G+0 (200 $m^2$) | 10,375 | 12,000 | 16,000 |
| G+0 (250 $m^2$) | 10,875 | 12,500 | 17,000 |
| G+1 (150 $m^2$) | 9,125 | 11,000 | 13,375 |
| G+1 (200 $m^2$) | 11,375 | 13,175 | 18,000 |
| G+1 (250 $m^2$) | 12,125 | 14,125 | 18,625 |
| G+2 (94 $m^2$) | 7,000 | 9,125 | 11,000 |
| G+2 (150 $m^2$) | 10,200 | 12,000 | 14,175 |
| G+2 (200 $m^2$) | 14,250 | 16,000 | 20,000 |
| G+2 (250 $m^2$) | 14,625 | 16,250 | 20,250 |

Source: Field survey, 2018

As *table 5* indicated, rental values of single-family G+0, G+1, and G+2 residential properties have shown dramatic increases in the last four years. For instance, the average rental value of single-family residential property with 200 $m^2$ plot area G+0 was rented with Birr 10,375 in 2014 which increased to 16,000 Birr in 2018 raised by 54.2% on year to year basis. Similarly, the average rental value of a residential property with 250 $m^2$ plot area G+1 was rented with Birr 12,125 in 2014 which increased to 18,625 Birr in 2018 raised by 53.6% on year to year basis. The same trend has also been observed for the rest plot areas as exhibited in table 5 during the considered period. All in all, the average rental annual growth rate of G+0, G+1, and G+2 properties of different plot sizes has been increasing by 13.9%, 13.2%, and 10.9% respectively.

Table 6: Summary of average sale values of single-family residential properties

| Types of residences | 2014 | 2016 | 2018 |
|---|---|---|---|
| | Sale (Birr) | Sale (Birr) | Sale (Birr) |
| G+0 (200 $m^2$) | 2.150 million | 3.950 million | 5.825 million |
| G+0 (300 $m^2$) | 3.050 million | 5.7 million | 9 million |
| G+0 (400 $m^2$) | 4.950 million | 8 million | 12.125 million |

| | | | |
|---|---|---|---|
| G+0 (500 $m^2$) | 7.750 million | 10.225 million | 14.5 million |
| G+1 (200 $m^2$) | 3.850 million | 6 million | 8 million |
| G+1 (300 $m^2$) | 5.7 million | 8.4 million | 12.750 million |
| G+1 (400 $m^2$) | 8 million | 11.125 million | 16.125 million |
| G+1 (500 $m^2$) | 10 million | 13 million | 18 million |
| G+2 (94 $m^2$) | 2.250 million | 3.4 million | 5 million |
| G+2 (200 $m^2$) | 4.950 million | 7.025 million | 10 million |
| G+2 (300 $m^2$) | 6.175 million | 10.3 million | 15 million |
| G+2 (400 $m^2$) | 9.050 million | 14.625 million | 19.625 million |
| G+2 (500 $m^2$) | 12.250 million | 15.625 million | 21.5 million |
| G+3 (94 $m^2$) | 3.5 million | 5.050 million | 6.825 million |
| G+3 (200 $m^2$) | 5.525 million | 11.125 million | 13.375 million |
| G+3 (300 $m^2$) | 8.15 million | 14.375 million | 18.375 million |
| G+3 (400 $m^2$) | 10.625 million | 16 million | 23.125 million |
| G+3 (500 $m^2$) | 14.125 million | 16.875 million | 25.375 million |

Source: Field survey, 2018

As *table 6* indicated, sale values of single-family G+0, G+1, G+2 and G+3 residential properties have shown exaggerated increases in the last four years. For instance, the average sale value of a residential property with 300 $m^2$ plot area G+1 was sold with Birr 5.7 million in 2014 which increased to 12.75 million Birr in 2018 elevated by 30.92% on year to year basis. Similarly, the average sale value of a residential property with 400 $m^2$ plot area G+3 was sold with Birr 10.625 million in 2014 which increased to 23.125 million Birr in 2018 upraised by 29.41% on year to year basis. The same trend has also been observed for the rest plot areas as exhibited in table 6 during the considered period. All in all, the average sale annual growth rate of G+0, G+1, G+2 and G+3 single-family residential properties of different plot sizes has been increasing by 37.37%, 25.81%, 27.97%, and 27.99% respectively.

According to the brokers & residents, the main cause for the higher differences (rise) in sale value of single-family residential properties (between 2014 and 2018) is due to the regularizations of internal access roads throughout the site in the year 2015, the high level of safety & security in the neighborhood due to the arrival of high income social classes in the locality, the intervention of

brokers and financial institutions to the market by using the opportunities of the expansions of road constructions & utility developments in the neighborhood, and an increasing of housing demand.

### 3.3.2 Impact of land use change on residential property values

As the findings of this study show *(from table 4 to 6)* the values of residential properties have been increasing over the past four years as a result of land use change created by different factors. For example, as depicted in table *6*, the average sale value of 300 $m^2$ (G+3) residential property was about 8.15 million Birr in 2014 which risen to about 18.375 million Birr as of now (2018). This was found true for all types of residential properties in the study area.

According to both the key informants and survey respondents, land use change is significantly occurred in the study area after 2010 mainly due to two major events: upgrading of one major gravel road to asphalt (a road from Ayat to Sahalite Mihret which passes through Safari roundabout) and commencement of Sunshine apartment buildings construction in the year is 2008/2009. This are believed to increase residential property values in the area, which was in fact in expensive before the year 2010 in the study area. Pursuant to Sunshine real-estate development and the mentioned road upgrading, internal access roads in 2014/15 are also believed to contribute for the heightening of property values in the study vicinity. This results blocks and open spaces to be more defined. Still, now roads are constructing and access are being created. In addition to that, business activities are significantly distributed along the two major asphalt roads. Another event in the year 2014/2015 was delivery of completed apartments by Sunshine real-estate to the owners and further expansion of building apartments on its site. These conditions have indeed created another major land use and residential property value changes on the site.

This study has therefore taken year 2015 as a milestone time for assessing residential property value changes due to the mentioned reasons. According to the key informants (residents and brokers), the values of residential properties in the nearby locality of the study area was comparatively similar to the study area prior to the year 2015. The pattern however significantly changed in the post 2015 era which is manifested in terms of substantial appreciation of values of residential properties of the study area compared to its nearby vicinity. In this regard almost all respondents agreed that there was no agglomeration of business activities prior to 2015, with the course being changed after that. Currently concentration of different business activities in the neighborhood is outwardly visible which is believed to be created as a result of the dramatic

changes in land use that in turn significantly affected residential property values. *Table 7 beneath shows that*, major changes in the study area in the period under reference were from farmland to residential, mixed-use & commercial activities respectively. Property use changes from residential to others have happened especially along major roads. This change of land use has positively affected (increase) values of residential properties within the neighborhood.

Table 7: Changes in land use in the study area before and after 2015 G.C

| No. | Land use change in the study area | No. of respondents | Percentage (%) |
|---|---|---|---|
| 1. | Farmland to residential | 18 | 36 |
| 2. | Farmland to commercial | 5 | 10 |
| 3. | Farmland to mixed use | 9 | 18 |
| 4. | Farmland to social service | 2 | 4 |
| 5. | Farmland to administration | 1 | 2 |
| 6. | Farmland to small-scale manufacturing | 2 | 4 |
| 7. | Residential to commercial | 4 | 8 |
| 8. | Residential to mixed use | 7 | 14 |
| 9. | Residential to social service | 2 | 4 |
| 10. | Total | 50 | 100 |

Source: Field survey, 2018

Generally, the findings of this study align with different other similar studies that discourse the relationship between land use change and residential property values. For instance, Emmanuel and Wan Zahari (2016), concluded that land use change has positively affected rental values of residential properties on Kaduna metropolis (Nigeria). Another study again from Nigeria by Adebayo (2009), depicted that land use change has affirmatively influenced values of both residential and commercial properties on the metropolis Lagos. Similar to this study, the mentioned authors also portray that there has been a substantial level of change in land use in their respecting study areas and this change has brought corresponding increase in values of residential properties.

### 3.4 Regression analysis

In this part of the study the data collected are coded & regressed by SPSS version 20. Also, the discussions & results are based on the regression analysis. Hence, a sample examination on the

relationship between urban land use change and residential property value were conducted using *single-family rental residential properties*. This was done in order to establish whether the variation in the dependent variable can be explained by variations in the independent variables in the study area. The same test could equally be conducted for other types of residential properties.

### 3.4.1 Definition of variables

As this study indicated, the rent price of residential property value is affected by different determinant factors of land use change. Let as allow all possible influences of rent that can be observed by this study. Thus, the model decomposes the rent price into variables that affect residential rental values and tries to consider the contributions of the following variables: housing demand, accessibility to road & transportation, quality of the neighborhood, safety & security, distributions of economic activities, land use regulation, availability of utility lines, availability of public service, topography, brokers interference, and intervention of financial institutions.

Hypothetically:

- ✓ Accessibility to road and transportation corridor has a significant impact and might be increase rental residential property value.
- ✓ Increasing of housing demand has significant impact & might increase residential rental value.
- ✓ Good quality of the neighborhood has significant impact & might increase rental value.
- ✓ The level of safety and security has a significant impact on rental residential property values. If the residential property is more secured and safe, the value might be increase if not decrease.
- ✓ The distributions of different economic activities in the neighborhood within a shorter distance has a significant impact and might be increase rental residential property value.
- ✓ Land use regulation has a significant impact on rental values of residential properties. If the parcels are regulated the rental value might be increase and if not the value might be decrease.
- ✓ The availability of utility lines such as water supply, electricity and sewerage line has a significant impact on rental values of residential properties. If the residential property has functional utility services the rental value might be increase and if not decrease.
- ✓ The availability of public service & urban amenities in the neighborhood within a walking distance has a significant impact and might be increase rental residential property value.
- ✓ Topography has a significant impact on rental values of residential properties. If the parcel has a gentle slope the rental value might be increase and if not the value might be decrease.

- ✓ Intervention of a real-estate broker has a significant impact on the values of residential properties. If the broker intervene in the rent process, the value might be increase.
- ✓ Intervention of financial institutions has a significant impact on the values of residential properties. If the rented residential property is under collateral, the value might be increase.

The variables are described as follows:

- ✓ *Accessibility to road and transportation (RT)* = a continuous variable which measures distance (in meter) from the main road/transport corridors i.e. a road from CMC roundabout to Summit trough Safari roundabout and a road from Safari round about to Sahalite Mihret.
- ✓ *Housing demand (HD)* = a dummy variable to indicate whether the tenant rents the property as a result of the increases of demand (1 = yes and 0 = if not).
- ✓ *The physical quality of the neighborhood (PQN)* = a dummy variable to indicate whether the property is located in a good quality of block layout and street network .i.e. accessible plots and constructed roads (1 = yes and 0 = if not).
- ✓ *Safety and security (SS)* = a dummy variable to indicate whether the property is safe and secure i.e. fence, no crime, street lighting (1 = yes and 0 = if not).
- ✓ *The distributions/agglomerations of economic activities in the neighborhood (AG)* = a dummy variable to indicate whether there are different business activities within 100 meter distance from the property i.e. shops, cafes, super markets etc. (1 = yes and 0 = if not).
- ✓ *Land use regulation (LR)* = a dummy variable to indicate whether the property is regulated by the city/local development plan i.e. title deed (1 = yes and 0 = if not).
- ✓ *Availability of utility lines (UL)* = a dummy variable to indicate whether the property has basic utilities i.e. water, electricity, sewerage (1 = yes and 0 = if not).
- ✓ *Availability of public service and amenities (PS)* = a continuous variable which measures distance (in meter) from public services i.e. educational service.
- ✓ *Topography (TOP)* = a dummy variable to indicate whether the property has a gentle slope (1 = yes and 0 = if not).
- ✓ *Intervention of a real-estate broker (IRB)* = a dummy variable to indicate whether the tenant rented the property with the intervention of broker (1 = yes and 0 = if not).
- ✓ *Intervention of financial institutions (IFI)* = a dummy variable to indicate whether the property has under collateral (1 = yes and 0 = if not).

### 3.4.2 Regression result

In order to run the regression, first we have to test & check assumptions of linear regression such as normality, homoscedasticity, linearity, absence of multicollinearity, and auto-correlation.

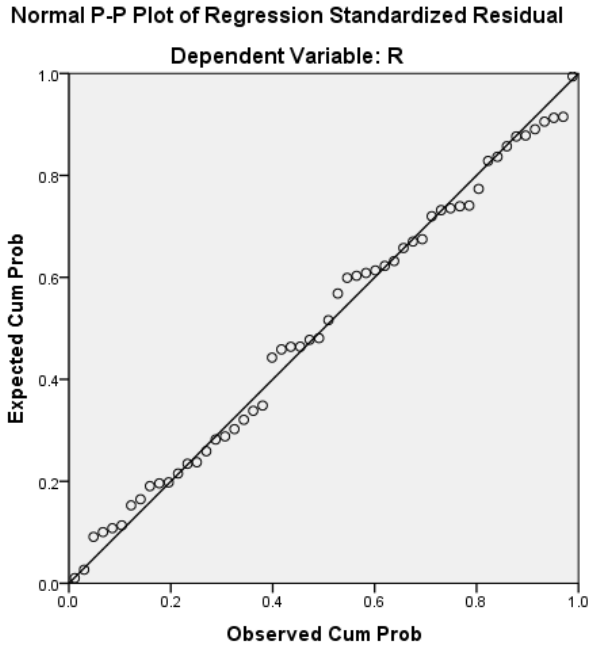
i. *Normality test:* in order to make valid inferences from the regression, the residuals of the regression should follow a normal distribution. Using the normal predicted probability (p- p) plot and using Shapiro-Wilk test we can determine if the data are normally distributed.

Table 8: Normality Test

| | Kolmogorov-Smirnov | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| R | .111 | 54 | .097 | .959 | 54 | .062 |

Source: Filed survey, 2018

The test is shown on table 8 (Shapiro-Wilk). The p-value is 0.062 which is greater than 0.050 (confidence level), it can concluded that the data comes from a normal distribution.

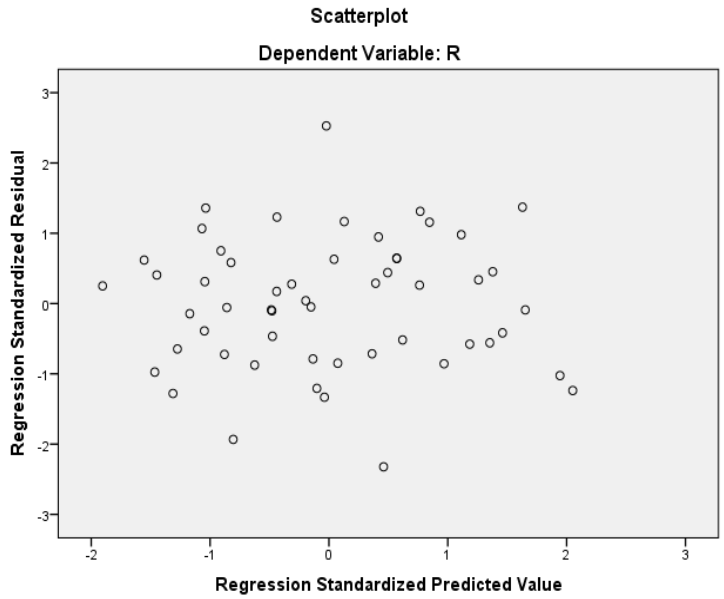



Similarly, the normal p-p plot in figure 13 also shows the normal distributions of the data, because the little circles follows the normality line.

Figure 13: Normal p-p plot of regression standardized residual

Source: Filed survey, 2018

ii. *Homoscedasticity test:* it is defined as the variance around the regression line the same for all values of the explanatory variables. The following plot shows Homoscedasticity test.




The data is Homoscedastic because there are points equally distributed above and below zero on the x axis, and to the left and right of zero on the y axis. As well as there is no a very tight or wide distribution to the left and right or above and below of the plot (figure 14).

Figure 14: Homoscedasticity test (scatterplot)

Source: Filed survey, 2018

iii. *Autocorrelation test: -* It is detected by Durbin Watson test. Its value is always between 0 and 4, a value of 2 or approximately close 2 usually indicates no autocorrelation problem *(table 9).*

iv. *Linearity test: -* It shows a straight line relationship between the predictor and the outcome variable. Usually, if the data are normal distribution and homoscedastic it has not to be worry about linearity. For this study, there is a linear relationship between them *(see table 9 beneath).*

v. *Multicollinearity test: -* This assumption is relevant for a multiple regression, it refers to when the predictor variables are highly correlated with each other (Kothari , 2004). It is a very serious problem because it will affect the model. It can check the absence of multicollinearity using Variance Inflation Factor (VIF) values which is located on the coefficient table. The values to be below 10, and best case would be if the values has to be below 5. Hence, to this study each value is below 5 indicating that there is no a multicollinearity problem *(see table 10 below).*

Therefore, for this study, the hedonic price model has the following form:

$R = f(RT_i, HD_i, PQN_i, SS_i, AG_i, LR_i, UL_i, PS_i, TOP_i, IRB_i, IFI_i)$ …….…… 1

Where

$RT_i$ = dimension/vector of road and transportation

$HD_i$ = dimension/vector of housing demand

$PQN_i$ = dimension/vector of physical quality of the neighborhood

$SS_i$ = dimension/vector of safety and security

$AG_i$ = dimension/vector of agglomeration of business activities

$LR_i$ = dimension/vector of land use regulation

$UL_i$ = dimension/vector of utility lines

$PS_i$ = dimension/vector of public service

$TOP_i$ = dimension/vector of topography

$IRB_i$ = dimension/vector of intervention of real estate broker

$IFI_i$ = dimension/vector of intervention of financial institutions

Therefore, the equation is writing as follows:

$R = \alpha + \sum_{i=1}^{n} \beta iXi + \mu$ ..... 2

$R = \alpha + \beta 1RT + \beta 2HD + \beta 3PQN + \beta 4SS + \beta 5AG + \beta 6LR + \beta 7UL + \beta 8PS + \beta 9TOP + \beta 10IRB + \beta 11IFI + \mu$ ..... 3

Where, R is the dependent variable (rent value), the coefficient α is simply the expected mean value of R if other explanatory variables become zero, which is the intercept of the graph. β is the beta (slope) coefficient that indicate the degree of influence the independent variable has on variations in the dependent variable (the higher the value of β the more influential the independent variable) and the sign (positive/negative) indicates the nature of the relationship (weather the independent variable and the dependent variable move together or in opposite direction). The subscript i denotes the observation numbers (1, 2…), and μ is the residual of which the difference between true value in the observation and the value estimated in the regression. The RT, HD…are independent variables. For this study, the significant level is 0.05 which means that there is only a 5 percent probability that the independent variable does not influence the dependent variable. The model has to be estimated by multiple regression and the regression result is shown below.

Table 9: Model Summary (single-family rental residential properties)

**Model Summary [b]**

| Mode | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .921[a] | .848 | .817 | 2654.635 | 2.162 |

a. Predictors: IFI, SS, HD, AG, PS, UL, IRB, PQN, RT b. Dependent Variable: R

Source: Field survey. 2018

From table 9, the coefficient of determination adjusted R square (the strength or magnitude of the relationship) value shows, 81.7% of the variation in the dependent (residential rental value) variable can be explained by variations in the independent variables. Meaning, the model explains (good fits in) the variations of the dependent variable at 81.7%. The remaining 18.3% are explained by other variables which the research did not intended to do.

Table 10: Coefficients of determination (single-family rental residential properties)

**Coefficients [a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | 7440.318 | 1762.807 | | 4.221 | .000 | | |
| | RT | -5.654 | 2.351 | -.218 | -2.405 | .020 | .422 | 2.370 |
| | HD | 2755.682 | 890.397 | .187 | 3.095 | .003 | .952 | 1.050 |
| | PQN | 3676.492 | 856.729 | .298 | 4.291 | .000 | .715 | 1.398 |
| | SS | 1686.368 | 829.779 | .128 | 2.032 | .048 | .879 | 1.138 |
| | AG | 3153.026 | 1025.746 | .238 | 3.074 | .004 | .575 | 1.739 |
| | UL | 3460.654 | 1030.582 | .257 | 3.358 | .002 | .589 | 1.697 |
| | PS | 11.781 | 2.996 | .270 | 3.933 | .000 | .734 | 1.363 |
| | IRB | 1880.984 | 920.641 | .146 | 2.043 | .047 | .675 | 1.481 |
| | IFI | 2248.794 | 840.389 | .183 | 2.676 | .010 | .740 | 1.351 |

a. Dependent Variable: R

Source: Field survey. 2018

The above table (10) shows, all the identified variables are significant *(see Sig. column)* because all the values are below 0.05 (5%) significant level. Yet, land use regulation & topography are deleted from the model because they are constants; meaning, all sample rental single-family residential properties are regulated and has a gentle topography. All the hypothetical assumptions made for this study except social service are true as the regression result exhibited. However, the assumption for social service is found to be the reverse, because the value of single-family rental residential properties increases as distance increases from social services. Similarly, the value of Variance Inflation Factor (VIF) shows that the model has not been an observed multi-collinearity problem (because the VIF value of each predictor variable is less 5).

Hereafter, the final model is estimated as follows (incessant from equation 3).

$$R = 7440 - 5.6RT + 2755.7HD + 3676.5PQN + 1686.3SS + 3153.0AG + 3460.6UL + 11.7PS + 1880.9IRB + 2248.8IFI \quad \ldots\ldots 4$$

Therefore, from the above equation (4), 7440 is the intercept of this linear relationship which is the value of the rent in which the variables become zero. The augmentation change on one meter distance from the main road/transport corridor will decrease the rent value of single-family residential properties by 5.6 Ethiopian Birr. Also the availability and functionality of basic utility lines particularly water, electricity and sewerage line will increase the rent value by 3460.6 Ethiopian Birr. From the model it can concluded that the significant variables identified in the study have increasing impact on residential property values in the study area.

### 3.5 The market value of affected residential properties in the study area

Sites in a neighborhood are not usually uniform in size, shape, and other physical and economic attributes and thus some might be superior or others might be inferior in comparison. As this study's analysis indicated, the variations of values of residential properties in the same neighborhood in the study area is due to site-specific and property specific characteristics such as number of stories, number of rooms, parking space, location, plot size also depicted by Ajibola et al. (2012) somewhere else in the globe. Therefore, the right value of affected residential properties should be professionally evaluated with apposite valuation techniques. Thus, two affected residential properties are identified in the study area and evaluated as follows.

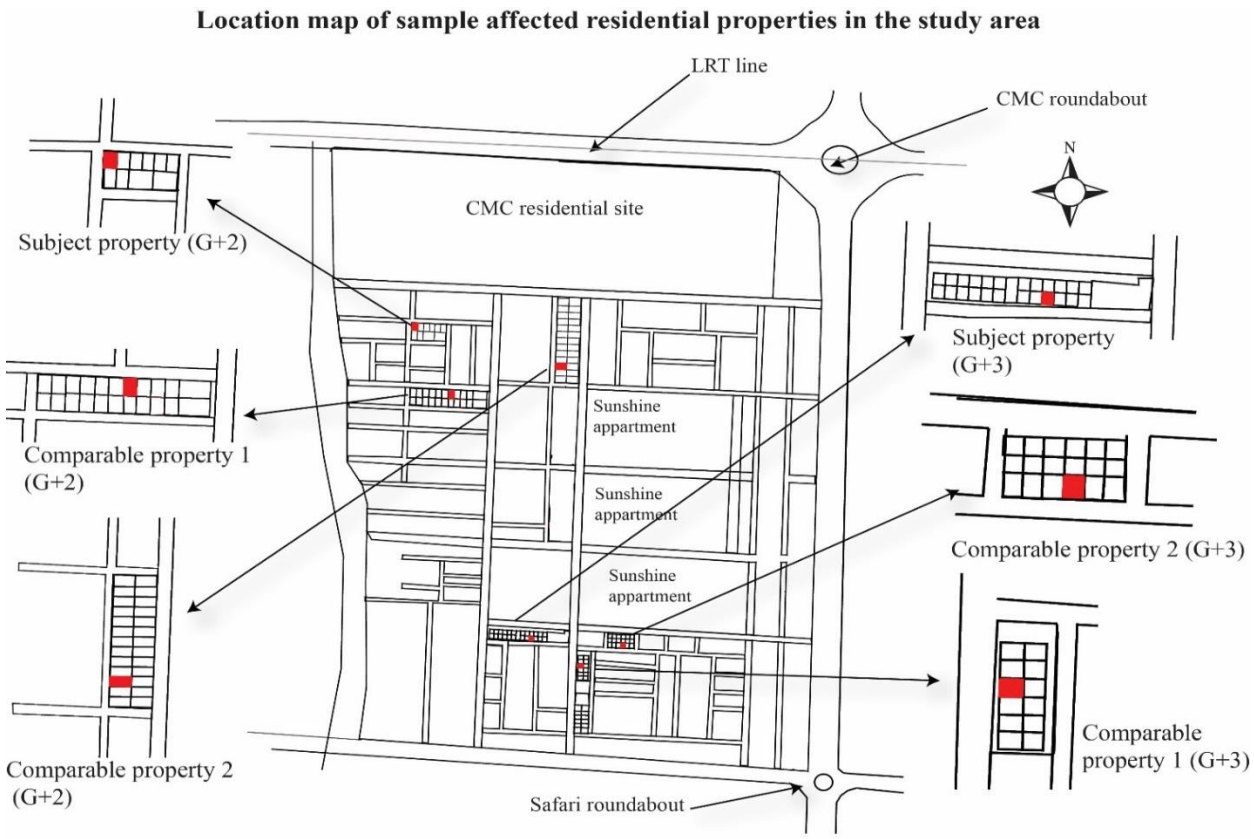



Figure 15: Location map of sample affected residential properties

### 3.5.1 Valuation of affected residential property (G+2)

***A. Basic information about the subject and comparable properties***

***Subject property:*** it is a G+2 residential property located at CMC-Safari area. It has a total area of 200 $m^2$ (10*20). From the total area, 90 $m^2$ is built-up and 110 $m^2$ is non-built-up. It is a detached new building with good conditions constructed before 8 years in 2009. The property was going to be sold on July 2018.

***Comparable property 1:*** it is a G+2 residential property located at CMC-Safari within 140 meters distance from the subject property. It has a total area of 204 $m^2$ (12*17), with a total built up area of 90 $m^2$. The typology of the property is a detached new building with good conditions constructed before 5 years (in 2013). It was sold on May 2018 with a transaction price of 10,200,000 Birr.

***Comparable property 2:*** it is a G+2 residential property located at CMC-Safari within 260 meters distance from the subject property. It has a total area of 250 $m^2$ (20*12.5) with 104 $m^2$ built-up

area. The typology of the property is a detached new building with good conditions constructed before 9 years (in 2009). It was sold on February 2018 with a transaction price of 11,800,000 Birr.

Both subject and comparable properties (one and two) have the following common attributes: they are located at the frontage of the local street. Also have regular parcel shape with a gentle slope. The properties are constructed by hollow concrete block with painted and plastered (internal partitions) and quartz (external walls). They have 8 rooms with available (some also in connecting stage) utilities such as water, sewerage line, and electricity. The sites are paved and has parking space, septic tank, and a water tanker. They also have title deed through freehold acquisition.

- **Sales comparison approach**

As discussed in the literature review part, this approach is mainly focused on recent sales of similar type of properties in the area analyzed to form an opinion of the value of the subject property. Thus, if there are more dissimilarities between the subject and comparable properties, more adjustments will have to be made in order to take account of the dissimilarities between the subject and the comparable properties. The market conditions of the comparable properties and required adjustments to the subject property are made in terms of the following comparison elements:

- ✓ *Transaction date* (the month of the deal that takes place)
- ✓ *Location* (the location of the property in terms of access road, topography, and locality)
- ✓ *Transaction condition (*indicates weather the transaction takes place on a normal condition in the open market or any special relationship/externalities between the buyer and the seller)
- ✓ *Age* (the year of construction of the property)
- ✓ *Built-up area (*the total building area with excludes the empty space around the building) and
- ✓ *Total area* (the area of the plot both built up and non-built up space)

Table 11: General information about the subject and comparable properties (G+2)

| General information about properties | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Location | Area (m2) | Built-up area (m2) | Age | Height | Transaction condition | Transaction date | Transaction price (birr) |
| Comp. 1 | CMC-Safari | 204 | 90 | 5 | G+2 | Normal | May,2018 | 10,200,000 |
| Comp. 2 | CMC-Safari | 250 | 104 | 9 | G+2 | Normal | Feb.,2018 | 11,800,000 |
| Subject property | CMC-Safari | 200 | 90 | 8 | G+2 | Normal | July,2018 | ? |

Source: Field survey, 2018

Table 12: Adjustments made (G+2)

| i. Adjustment of Sale Price by Transaction Date | | | |
|---|---|---|---|
| | Subject property | Comparable 1 | Comparable 2 |
| Transaction price | | 10,200,000.00 | 11,800,000.00 |
| Transaction date | July,2018 | May,2018 | February,2018 |
| Difference in months | | 2 | 5 |
| Adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| Monthly price growth | 2.33% | | |
| ii. Adjustment of Sale Price by Location | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| Location | | Similar | Similar |
| Required adjustment | | 0.00 | 0.00 |
| Adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| iii. Adjustment of Sale Price by Transaction Condition | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| Transaction condition | | Normal | Normal |
| Required adjustment | | 0.00 | 0.00 |
| Adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| iv. Adjustment of Sale Price by Age | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| Age | 8 | 5 | 9 |
| Economic life | | 30 | 30 |
| Annual depreciation rate | | 3.33% | 3.33% |
| Annual depreciation | | 356,028.58 | 441,342.37 |
| Required adjustment | | 1,068,085.75 | -441,342.37 |
| Adjusted sale price | | 11,748,943.23 | 12,798,928.74 |
| v. Adjustment of Sale Price by Built-up Area | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 11,748,943.23 | 12,798,928.74 |
| Built-up area | 90 | 90 | 104 |
| Required adjustment | | 0 | 1,049,985.52 |
| Adjusted sale price | | 11,748,943.23 | 11,748,943.23 |
| vi. Net Adjustment | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 11,748,943.23 | 11,748,943.23 |

| | | | |
|---|---|---|---|
| Area/m2 | 200 | 204 | 250 |
| Adjusted sale price/m2 | | 57,592.86 | 46,995.77 |
| Average sale price/m2 | 52,294.32 | | |
| Indicated value of the subject property | **10,458,863.19** | | |

Source: Field survey, 2018 and computed with Microsoft Excel

i. Adjustment of sale price by transaction date: According to the analysis made for this study, the monthly growth rate of G+2 residential properties is 2.33% *(table 6). From table 12*, the *adjusted sale price* is calculated with excel functions =-FV(rate;nper;pv) by which, the "rate" is monthly price growth, "nper" is the number of periods showing the differences in months of the transaction, and "pv" represents the present value which is the transaction price of the comparable property. Thus, the *adjusted sale price with transaction date*: =-FV(2.33%,2,,10.2 million) for comparable 1 and =-FV(2.33%,5,,11.8 million) for comparable property 2.

ii. Adjustment of sale price by location: both the subject & comparable properties are located in a similar locality, nearly similar slope, frontage to Local Street and regular shape of plots. *Table 12 above and 13 below illustrates., required adjustment* is prepared in excel: =IF(O13="Similar",0,($O$12-$P$12)) (comparable 1) and =IF(P13="Similar",0,($O$12-$P$12)) (comparable 2). Then, *the adjusted sale price with location* =O12+O14 (comparable 1) =P12+P14 (comparable 2).

Table 13: Adjustment of sale price by location (G+2)

| | L | M | N | O | P |
|---|---|---|---|---|---|
| 9 | | | | | |
| 10 | | Adjustment by Location | | | |
| 11 | | | Subject property | Comparable 1 | Comparable 2 |
| 12 | | Previously adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| 13 | | Location | | Similar | Similar |
| 14 | | Required adjustment | | 0.00 | 0.00 |
| 15 | | Adjusted sale price | | 10,680,857.48 | 13,240,271.11 |

Source: Field survey, 2018 and computed with Microsoft Excel

iii. Adjustment of sale price by transaction condition: according to the property owners, all the transactions are normal without any special relationship between the buyer and the seller. *Table 12 above & 14 underneath shown that* the *required adjustment*: =IF(O20="Normal",0,($O$19-$P$19)) for comparable 1 and =IF(P20="Normal",0,($O$19-$P$19)) for comparable 2.

*Adjusted sale price* with transaction condition: =O19+O21 (for comparable 1) =P19+P21 (for comparable 2).

Table 14: Adjustment of sale price by transaction condition (G+2)

| | L | M | N | O | P |
|---|---|---|---|---|---|
| 16 | | | | | |
| 17 | | Adjustment by Transaction Condition | | | |
| 18 | | | Subject property | Comparable 1 | Comparable 2 |
| 19 | | Previously adjusted sale price | | 10,680,857.48 | 13,240,271.11 |
| 20 | | Transaction condition | | Normal | Normal |
| 21 | | Required adjustment | | 0.00 | 0.00 |
| 22 | | Adjusted sale price | | 10,680,857.48 | 13,240,271.11 |

Source: Field survey, 2018 and computed with Microsoft Excel

iv. Adjustment of sale price by age: According to the information from owners, the age of the comparable property one is 5 and comparable two is 9 years. Information from building professionals for a similar type of buildings, the economic life is usually designed for 30 years. Thus, depreciation is calculated by age-life method: Depreciation (%) = (effective age/economic life of a building)*100. Therefore, *table 12 portrayed, annual depreciation rate* for comparable 1 = (5/30)/5 and = (9/30)/9 (comparable 2). Also, the amount of *annual depreciation* = 10,680,857.48*3.33% (comparable 1) and = 13,240,271.11*3.33% (comparable 2). The *required adjustment* is calculated with age differences between subject and comparable property multiplied by annual depreciation of the comparable property. Therefore, *required adjustment* =IF(5=8,0,-(5-8)*356,028.58) for comparable 1 and =IF(9=8,0,-(9-8)*441,342.37) for comparable 2. Finally, *adjusted sale price* with age: =10,680,857.48+1,068,085.75 (comparable 1) and =13,240,271.11+ (-441,342.37) (comparable 2).

v. Adjustment of sale price by built up area: If there is a difference in built-up areas among subject and comparable properties, there will be made a subtraction of price; in our case; previously adjusted price of comparable one - comparable two, because the built-up area of comparable one and the subject property is similar. Therefore, from *table 12*, *required adjustment*: for comparable property one =IF(90=90,0,-(11,748,943.23-12,798,928.74)) and for comparable

property two =IF(104=90,0,-(11,748,943.23-12,798,928.74)). Finally, the *adjusted sale price* =11,748,943.23-0 (comparable 1) and =12,798,928.74-1,049,958.52 (comparable 2).

vi. Net adjustment: The adjusted sale price has been established for each comparable properties that should realistically reflect what the subject would sell in the current market. Through this judgment, I arrive at a final opinion of value for the subject property. Thus, *table 12*, indicated that the estimated value of the subject property with sales comparison approach is 10,458,869.19 Ethiopian Birr. The *adjusted sale price*/$m^2$ is calculated: =11,748,943.23/204 for comparable property one and =11,748,943.23/250 for comparable property two. The sale price per meter square of the subject property is in use from the average adjusted sale prices of comparable properties which is calculated as follows =AVERAGE(57,592.86:46,995.77). As a final point, the indicated value of the subject property is =52,294.32*200.

### 3.5.2 Valuation of affected residential property (G+3)

***Subject property:*** it is a G+3 residential property located at CMC-Safari. The total area of the subject property is 72 $m^2$ (8*9). From it 48 $m^2$ is built-up and 24 $m^2$ is unbuilt-up. The typology of the property is an attached new building with good condition constructed before 6 years (in 2012). The property was going to be sold on July 2018.

***Comparable property 1:*** it is a G+3 residential property located at CMC-Safari within 85 meter distance from the subject property. It has a total area of 94 $m^2$ (9*10.5) with a total built up area of 60 $m^2$. The typology of the property is attached new building with good condition constructed before 8 years (in 2010). It was sold on April 2018 with a transaction price of 6,800,000 Birr.

***Comparable property 2:*** it is a G+3 residential property located at CMC-Safari within 150 meter distance from the subject property. It has a total area of 72 $m^2$ (8*9) with a total built up area of 48 $m^2$. The typology of the property is attached new building with good condition constructed before 3 years (in 2015). It was sold on May 2018 with a transaction price of 5,500,000 Birr.

Both subject & comparable properties have the following common attributes: regular parcel shape with gentle slope & located at the frontage of the local street. They are constructed by hollow concrete block painted & plastered (internal) and quartz (external walls). They also have 8 rooms with available utilities such as water, sewerage line, and electricity. The site is paved and has a building parking space and water tanker. They have a title deed through a freehold acquisition.

Table 15: General information about the subject and comparable properties (G+3)

| General information about properties | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Location | Area (m2) | Built-up area (m2) | Age | Height | Transaction condition | Transaction date | Transaction price (birr) |
| Comp. 1 | CMC-Safari | 94 | 60 | 8 | G+3 | Normal | April,2018 | 6,800,000.00 |
| Comp. 2 | CMC-Safari | 72 | 48 | 3 | G+3 | Normal | May,2018 | 5,500,000.00 |
| Subject property | CMC-Safari | 72 | 48 | 6 | G+3 | Normal | July,2018 | ? |

Source: Field survey, 2018

Table 16: Adjustment made (G+3)

| i. Adjustment by Transaction Date | | | |
|---|---|---|---|
| | Subject property | Comparable 1 | Comparable 2 |
| Transaction price | | 6,800,000.00 | 5,500,000.00 |
| Transaction date | July,2018 | April,2018 | May,2018 |
| Difference in months | | 3 | 2 |
| Adjusted sale price | | 7,286,480.97 | 5,759,285.90 |
| Monthly price growth | 2.33% | | |
| ii. Adjustment by Location | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 7,286,480.97 | 5,759,285.90 |
| Location | | Similar | Similar |
| Required adjustment | | 0.00 | 0.00 |
| Adjusted sale price | | 7,286,480.97 | 5,759,285.90 |
| iii. Adjustment by Transaction Condition | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 7,286,480.97 | 5,759,285.90 |
| Transaction condition | | Normal | Normal |
| Required adjustment | | 0.00 | 0.00 |
| Adjusted sale price | | 7,286,480.97 | 5,759,285.90 |
| iv. Adjustment by Age | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 7,286,480.97 | 5,759,285.90 |
| Age | 6 | 8 | 3 |
| Economic life | | 30 | 30 |
| Annual depreciation rate | | 3.33% | 3.33% |
| Annual depreciation | | 242,882.70 | 191,976.20 |

| | | | |
|---|---|---|---|
| Required adjustment | | -485,765.40 | 575,928.59 |
| Adjusted sale price | | 6,800,715.57 | 6,335,214.48 |
| v. Adjustment by Built-up Area | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 6,800,715.57 | 6,335,214.48 |
| Built-up area | 48 | 60 | 48 |
| Required adjustment | | -465,501.09 | 0.00 |
| Adjusted sale price | | 6,335,214.48 | 6,335,214.48 |
| vi. Net Adjustment | | | |
| | Subject property | Comparable 1 | Comparable 2 |
| Previously adjusted sale price | | 6,335,214.48 | 6,335,214.48 |
| Area/m2 | 72 | 94 | 72 |
| Adjusted sale price/m2 | | 67,395.90 | 87,989.09 |
| Average sale price/m2 | 77,692.49 | | |
| Indicated value of the subject property | **5,593,859.60** | | |

Source: Field survey, 2018 and computed with Microsoft Excel

Adjustment of sale price by transaction date, location, transaction condition, age, built up area, set adjustment: the processes is similar with the producer's followed for the appraisal of G+2 residential properties. As *table 16 above* shown the estimated value of the subject property with sales comparison approach is 5,593,859.60 Ethiopian Birr.

*As a conclusion*, the market values of sample affected residential properties as the analysis on table 12 indicated for G+2 (10,458,863.19 which is rounded to 10,459,000 Ethiopian birr) and the analysis on table 16 for G+3 (5,593,859.60 which is rounded to 5,594,000 Ethiopian birr) is applicable only to the date of valuation (July 2018). But, the values of the properties are going to be changing according to growth rates investigated by this study (2.33% per month for both G+2 and G+3) residential properties. So far, these growth rates are applicable only to residential properties in the study area, CMC-Safari.

# CHAPTER FOUR: CONCLUSION AND RECOMMENDATION

## 4.1 Conclusions

This study examined the impact of land use change on residential property values at Bole sub-city in a specific locality name CMC-Safari area. The study was limited to probing of the relationship between land use change and residential property values via assessing the trends over brief period of time (2014 to 2018 G.C.). For that, it assessed the major changes in land use, determinant factors for land use change that affected residential property values and impacts of land use change on residential property values in the study area. The study also tried to appraise the market values of sample affected residential properties using sales comparison approach, which is the most applicable technique for the valuation of residential properties.

Findings of the study in a nutshell depicts that, the study area (CMC-Safari) has passed through substantial change in land use in the last 15 years mainly from farmland to different urban functions (residential, commercial, mixed-use, social service, greenery and open space, administration, and small-scale manufacturing). Inter alia, residential function has been observed to feature the lion share in terms of land use change (59%), and the least is observed in small-scale manufacturing (0.3%). This change has fetched a corresponding alteration in both rental and capital values of residential properties mainly in the last four years. Increase in demand for residential property has led to a conversion of farmland into different urban land uses and mainly for residential function.

Furthermore, the determinant factors for land use change that affected residential property values in the study area are all the variables identified from the literature and case studies identified from Nigeria. These include housing demand, road construction & transport access, utility development, safety and security, development of public services, physical qualities of the neighborhood, land use regulation, agglomeration of business activities, and topography. Among them, the study revealed that housing demand is the major determinant of land use change that affected residential property values as confirmed by the survey respondents. Other influential factors identified by this study in their decreasing order of importance encompass road construction & transport access, agglomeration of business activities, utility developments, safety & security, land use regulation, physical quality of the neighborhood, topography, and public service taking the least influence. Generally, it was found that all the variables identified by this study are significantly important factors as the RII values for the entire attributes were found to be above the average (0.500).

Apart from the underwent case study and literature, brokers interference to the property market, social class influx (arrival of high-income social groups), involvement of financial institutions through loan provisions using as collateral, and real-estate development companies are identified to be the salient determinants of residential property values in the study area. Property-specific factors such as partition/number of rooms and opening orientation (window and door) are also identified as supplemental causes by this paper.

The study further keyed out that land use change positively affected both rental & sale values of residential properties in the study area also buttressed with a regression analysis. The regression analysis depicted that the identified factors of land use change explains the variations in single-family rental residential property values at 81.7%. The increase of housing demand, road construction & transportation access, concentration of economic activities, development of utility lines, increasing of safety & security, broker's interference to the market, intervention of financial institutions, and others in fact dictated residential property values to be high in the study area.

The researcher noted that findings of this study aligns with other similar works. For instance, Emmanuel and Wan Zahari (2016), concluded land use change has positively affected rental values of residential properties at 27% on Kaduna metropolis, Nigeria. Oruonye (2014), also deducted new road construction is the major determinant of land use change that increased values of both residential and commercial properties on Taraba state, Nigeria. Another study again from Nigeria by Adebayo (2009), depicted land use change has affirmatively influenced values of both residential & commercial properties on the metropolis Lagos. Similar to this study, the mentioned authors portray, there has been a substantial level of change in land use in their respecting study areas and this change has brought corresponding increase in values of residential properties. Apart from them, this study however tried to evaluate the market values of affected residential properties.

Overall, it can be concluded that the findings of this study have contributed greatly to the body of knowledge of urban and real-estate economics in general and land use and residential property values in particular. The result chiefly helps developing nations where their cities are expanding horizontally with a prompt speed similar to Addis Ababa featured with the corresponding rise in demand and values of residential properties in an alarming rate.

### 4.2 Recommendations

The following facts and recommendations are forwarded based on the findings of the study.

- ✓ Addis Ababa is recommended to devise a mechanics which minimizes broker's role of property market distortions and maximizes professional property appraiser's role which is indeed crucial to manage the residential property market. The study revealed that one of the main causes of residential property values escalation in the study area is due to broker's interference which negatively exploited the opportunities created by land use changes. For instance, most of the respondents confirmed that, if for example, let say one residential property is recently sold 4 million birr in the locality, after that it is very challenging to buy residential properties with a value of less than 4 million birr throughout the neighborhood. Because brokers use this value as a bench-mark without any information about the transaction conditions.
- ✓ The city administration is also recommended to consider placement of land value capture tax on property owners during the benefits gained from infrastructure development (road and other infrastructures). For instance, this study depicted that in the year 2015 G.C the values of residential properties has been escalated than the previous years due to the construction and regularizations of internal access roads and supportive utility developments throughout the neighborhood. As a result property owners has benefited from the infrastructure development which triggers to increase the values of their properties. This recommendation is indeed essential to generate a shared benefit among the residents and the public in such a way that the extra tax generated should be allotted to improve infrastructure provision in the locality.
- ✓ As the study result point out, even though there is a supply of land for residential use in the study area (which is facilitated by the city master plan, 2002), its value and demand also increase on the adjacent flank. Therefore, further studies in relation to "supply and demand factors for residential properties" might be supplement additional empirical evidences.
- ✓ All the 14 factors identified by this study are vital determining factors for residential property values in the study area. Other researchers interested on residential property values are also recommended to further studies in order to examine the impacts of each variables separately on residential property values. Also, the regression analysis in this study primary focused on single-family residential properties, equally sale values are too important and it is also recommended to be tested by other interested researchers.

- ✓ As a general recommendation, there is also a need to create city wide database system for property transactions conducted elsewhere in the city. Transparency of information is another issue requiring intervention, which could in fact be accessible to residents through Medias (internet/websites or other means of communications.
- ✓ Areas requiring further investigations based on this study's recommendations include:
  - How to minimize the roles of brokers and to maximize the roles of property valuators for the efficiency of the residential property market?
  - How to enforce extra taxation from owners during the benefits gained from infrastructure development (i.e. road construction)?
  - How to show the relationships between demand and supply factors in residential property market?
  - How to create a city-wide database system for property transactions?

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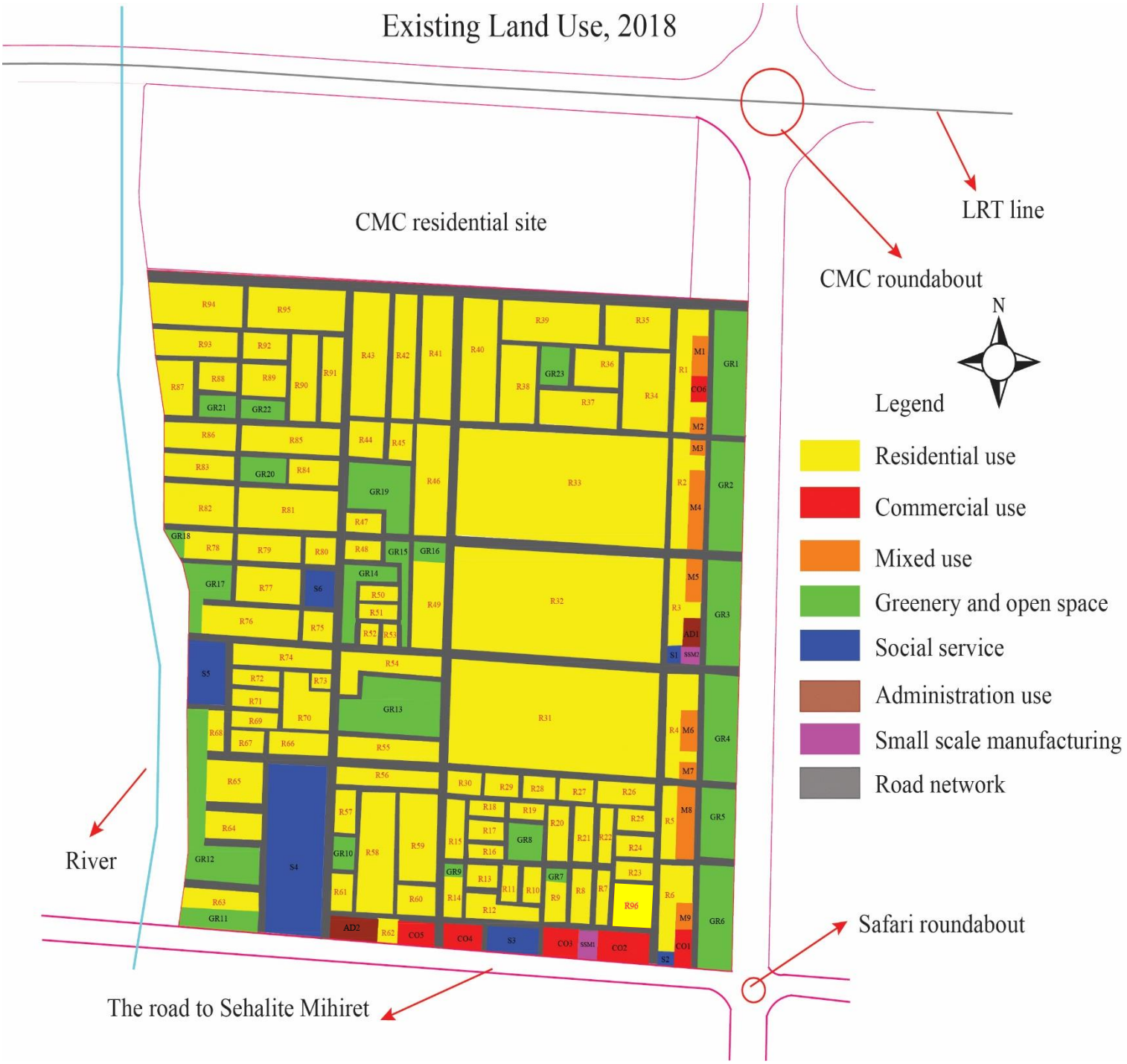
**Appendixes**

Annex 1: Land use map of the study area and area coverage of each land use (by block)

## Land use map of the study area



# Area coverage of the study area (by Block)

| No. | Types of land use | Code (block) | Area ($m^2$) |
|---|---|---|---|
| 1. | **Residential** | R1 | 5186.2019 |
| 2. | | R2 | 4161.0470 |
| 3. | | R3 | 3238.7712 |
| 4. | | R4 | 4553.9132 |
| 5. | | R5 | 2171.6111 |
| 6. | | R6 | 4032.4576 |
| 7. | | R7 | 1325.7268 |
| 8. | | R8 | 1992.6869 |
| 9. | | R9 | 1990.9002 |
| 10. | | R10 | 1238.8333 |
| 11. | | R11 | 1156.1855 |
| 12. | | R12 | 2741.9901 |
| 13. | | R13 | 1347.1372 |
| 14. | | R14 | 1377.1054 |
| 15. | | R15 | 2022.4124 |
| 16. | | R16 | 857.1627 |
| 17. | | R17 | 1209.8027 |
| 18. | | R18 | 957.3263 |
| 19. | | R19 | 985.2840 |
| 20. | | R20 | 2152.7150 |
| 21. | | R21 | 2077.0639 |
| 22. | | R22 | 1388.8279 |
| 23. | | R23 | 1218.4824 |
| 24. | | R24 | 1442.6818 |
| 25. | | R25 | 1455.9297 |
| 26. | | R26 | 2409.0677 |
| 27. | | R27 | 1375.5333 |
| 28. | | R28 | 1326.9627 |
| 29. | | R29 | 1394.1982 |
| 30. | | R30 | 1396.8176 |
| 31. | | R31 | 43305.0263 |
| 32. | | R32 | 43232.4341 |
| 33. | | R33 | 45321.8313 |
| 34. | | R34 | 6882.5444 |
| 35. | | R35 | 5777.4154 |
| 36. | | R36 | 3149.9643 |

| | | | |
|---|---|---|---|
| 37. | | R37 | 5231.1001 |
| 38. | | R38 | 5327.4994 |
| 39. | | R39 | 7532.1761 |
| 40. | | R40 | 8362.8177 |
| 41. | | R41 | 7313.2417 |
| 42. | | R42 | 5303.8026 |
| 43. | | R43 | 8542.6841 |
| 44. | | R44 | 2329.1965 |
| 45. | | R45 | 1546.8298 |
| 46. | | R46 | 7074.9124 |
| 47. | | R47 | 1351.6495 |
| 48. | | R48 | 1338.6503 |
| 49. | | R49 | 5252.4406 |
| 50. | | R50 | 1130.2194 |
| 51. | | R51 | 1059.9278 |
| 52. | | R52 | 667.6804 |
| 53. | | R53 | 564.6769 |
| 54. | | R54 | 4585.6304 |
| 55. | | R55 | 4183.6641 |
| 56. | | R56 | 3262.5169 |
| 57. | | R57 | 1660.8652 |
| 58. | | R58 | 8309.4048 |
| 59. | | R59 | 6398.8658 |
| 60. | | R60 | 2121.5340 |
| 61. | | R61 | 1493.1690 |
| 62. | | R62 | 983.4028 |
| 63. | | R63 | 2982.4691 |
| 64. | | R64 | 3106.2852 |
| 65. | | R65 | 4619.0992 |
| 66. | | R66 | 2507.8009 |
| 67. | | R67 | 1336.2016 |
| 68. | | R68 | 1389.1459 |
| 69. | | R69 | 1354.7442 |
| 70. | | R70 | 4310.3046 |
| 71. | | R71 | 1557.5314 |
| 72. | | R72 | 1448.4325 |
| 73. | | R73 | 545.3027 |
| 74. | | R74 | 3798.6018 |
| 75. | | R75 | 1669.2423 |

| | | | |
|---|---|---|---|
| 76. | | R76 | 5440.8222 |
| 77. | | R77 | 4324.7233 |
| 78. | | R78 | 2528.6741 |
| 79. | | R79 | 3160.3142 |
| 80. | | R80 | 1514.5383 |
| 81. | | R81 | 7740.7444 |
| 82. | | R82 | 5500.7423 |
| 83. | | R83 | 3110.6116 |
| 84. | | R84 | 2308.2359 |
| 85. | | R85 | 4920.7241 |
| 86. | | R86 | 3600.6226 |
| 87. | | R87 | 3457.5503 |
| 88. | | R88 | 1982.7571 |
| 89. | | R89 | 2659.1770 |
| 90. | | R90 | 4306.7527 |
| 91. | | R91 | 3255.4547 |
| 92. | | R92 | 2129.8635 |
| 93. | | R93 | 4090.5574 |
| 94. | | R94 | 7408.3041 |
| 95. | | R95 | 7646.1607 |
| 96. | | R96 | 3013.3899 |
| 97. | **Commercial** | CO1 | 1261.7458 |
| 98. | | CO2 | 3042.7795 |
| 99. | | CO3 | 2010.0161 |
| 100. | | CO4 | 1873.9850 |
| 101. | | CO5 | 1642.5644 |
| 102. | | CO6 | 825.1007 |
| 103. | **Mixed use** | M1 | 1288.5793 |
| 104. | | M2 | 523.9033 |
| 105. | | M3 | 446.7373 |
| 106. | | M4 | 2446.3454 |
| 107. | | M5 | 1357.1113 |
| 108. | | M6 | 1389.8343 |
| 109. | | M7 | 590.8325 |
| 110. | | M8 | 2551.8279 |
| 111. | | M9 | 843.2290 |
| 112. | **Social service** | S1 | 464.9082 |
| 113. | | S2 | 467.4379 |
| 114. | | S3 | 2618.4705 |

| | | | |
|---|---|---|---|
| 115. | | S4 | 19403.8322 |
| 116. | | S5 | 4664.0976 |
| 117. | | S6 | 1976.2200 |
| 118. | | AD1 | 984.0656 |
| 119. | **Administration** | AD2 | 2077.1721 |
| 120. | **Small Scale** | SSM1 | 1033.0888 |
| 121. | **Manufacturing** | SSM2 | 620.2877 |
| 122. | | GR1 | 8183.0124 |
| 123. | | GR2 | 7257.5768 |
| 124. | | GR3 | 6940.9722 |
| 125. | **Greenery and open space** | GR4 | 6988.7918 |
| 126. | | GR5 | 4721.4461 |
| 127. | | GR6 | 7115.4012 |
| 128. | | GR7 | 523.6321 |
| 129. | | GR8 | 2339.6298 |
| 130. | | GR9 | 449.3510 |
| 131. | | GR10 | 1301.3794 |
| 132. | | GR11 | 3011.3055 |
| 133. | | GR12 | 10337.3169 |
| 134. | | GR13 | 10380.4659 |
| 135. | | GR14 | 3240.5675 |
| 136. | | GR15 | 2015.1625 |
| 137. | | GR16 | 1166.6074 |
| 138. | | GR17 | 3959.3281 |
| 139. | | GR18 | 667.9033 |
| 140. | | GR19 | 6948.0581 |
| 141. | | GR20 | 2123.7012 |
| 142. | | GR21 | 1477.3167 |
| 143. | | GR22 | 1540.4986 |
| 144. | | GR23 | 2085.9690 |

Annex 2: Frequency tables of the responses of respondents

**Rent value of two bedrooms on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 4800.00 | 1 | 25.0 |
| | 5000.00 | 2 | 50.0 |
| | 5200.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of two bedrooms on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 7000.00 | 1 | 25.0 |
| | 7500.00 | 2 | 50.0 |
| | 8000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of two bedrooms now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8500.00 | 1 | 25.0 |
| | 9000.00 | 1 | 25.0 |
| | 10000.00 | 1 | 25.0 |
| | 11000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of two bedrooms on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 1300000.00 | 1 | 25.0 |
| | 1400000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Sale value of two bedrooms on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 1800000.00 | 2 | 50.0 |
| | 2000000.00 | 1 | 25.0 |
| | 2200000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of two bedrooms now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 2500000.00 | 3 | 75.0 |
| | 3000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of three bedrooms on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 6000.00 | 4 | 100.0 |

**Rent value of three bedrooms on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8000.00 | 1 | 25.0 |
| | 8500.00 | 1 | 25.0 |
| | 9000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of three bedrooms now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 9500.00 | 1 | 25.0 |
| | 12000.00 | 1 | 25.0 |
| | 12500.00 | 1 | 25.0 |
| | 13000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of three bedrooms on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 1500000.00 | 3 | 75.0 |
| | 1600000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of three bedrooms on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 2200000.00 | 2 | 50.0 |
| | 2400000.00 | 1 | 25.0 |
| | 2500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of three bedrooms now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 3000000.00 | 1 | 25.0 |
| | 3500000.00 | 2 | 50.0 |
| | 3800000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+0 (150 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 7500.00 | 1 | 25.0 |
| | 7800.00 | 1 | 25.0 |
| | 8000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of G+0 (150 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8500.00 | 1 | 25.0 |
| | 9000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Rent value of G+0 (150 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12000.00 | 2 | 50.0 |
| | 12500.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of G+0 (200 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 10000.00 | 1 | 25.0 |
| | 10500.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Rent value of G+0 (200 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12000.00 | 4 | 100.0 |

**Rent value of G+0 (200 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 16000.00 | 4 | 100.0 |

**Rent value of G+0 (250 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 10500.00 | 1 | 25.0 |
| | 11000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Rent value of G+0 (250 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12500.00 | 4 | 100.0 |

**Rent value of G+0 (250 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 17000.00 | 4 | 100.0 |

**Rent value of G+1 (150 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 9000.00 | 3 | 75.0 |
| | 9500.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+1 (150 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 11000.00 | 4 | 100.0 |

**Rent value of G+1 (150 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 13000.00 | 2 | 50.0 |
| | 13500.00 | 1 | 25.0 |
| | 14000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+1 (200 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 11000.00 | 1 | 25.0 |
| | 11500.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Rent value of G+1 (200 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 13000.00 | 2 | 50.0 |
| | 13200.00 | 1 | 25.0 |
| | 13500.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+1 (200 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 18000.00 | 4 | 100.0 |

**Rent value of G+2 (94 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 7000.00 | 2 | 50.0 |
| Missing | System | 2 | 50.0 |
| Total | | 4 | 100.0 |

**Rent value of G+2 (94 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 9000.00 | 3 | 75.0 |
| | 9500.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (94 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 11000.00 | 4 | 100.0 |

**Rent value of G+1 (250 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12000.00 | 3 | 75.0 |
| | 12500.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+1 (250 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000.00 | 3 | 75.0 |
| | 14500.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+1 (250 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 18000.00 | 1 | 25.0 |
| | 18500.00 | 1 | 25.0 |
| | 19000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (150 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 9800.00 | 1 | 25.0 |
| | 10000.00 | 1 | 25.0 |
| | 10500.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (150 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12000.00 | 4 | 100.0 |

**Rent value of G+2 (150 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000.00 | 2 | 50.0 |
| | 14200.00 | 1 | 25.0 |
| | 14500.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (200 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000.00 | 2 | 50.0 |
| | 14500.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (200 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 16000.00 | 4 | 100.0 |

**Rent value of G+2 (200 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 20000.00 | 4 | 100.0 |

**Sale value of G+0 (200 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 2000000.00 | 1 | 25.0 |
| | 2200000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (200 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 3800000.00 | 1 | 25.0 |
| | 4000000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (200 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 5500000.00 | 1 | 25.0 |
| | 5800000.00 | 1 | 25.0 |
| | 6000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (250 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000.00 | 1 | 25.0 |
| | 14500.00 | 1 | 25.0 |
| | 15000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (250 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 16000.00 | 3 | 75.0 |
| | 17000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Rent value of G+2 (250 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 20000.00 | 3 | 75.0 |
| | 21000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (300 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 3000000.00 | 3 | 75.0 |
| | 3200000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (300 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 5500000.00 | 2 | 50.0 |
| | 5800000.00 | 1 | 25.0 |
| | 6000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (300 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 9000000.00 | 4 | 100.0 |

**Sale value of G+0 (400 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 4800000.00 | 1 | 25.0 |
| | 5000000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (400 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8000000.00 | 4 | 100.0 |

**Sale value of G+0 (400 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12000000.00 | 3 | 75.0 |
| | 12500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (200 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 3800000.00 | 3 | 75.0 |
| | 4000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (200 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 5800000.00 | 1 | 25.0 |
| | 6000000.00 | 2 | 50.0 |
| | 6200000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (200 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8000000.00 | 4 | 100.0 |

**Sale value of G+0 (500 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 7600000.00 | 2 | 50.0 |
| | 7800000.00 | 1 | 25.0 |
| | 8000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (500 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 10000000.00 | 2 | 50.0 |
| | 10400000.00 | 1 | 25.0 |
| | 10500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+0 (500 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000000.00 | 2 | 50.0 |
| | 15000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (300 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 5500000.00 | 2 | 50.0 |
| | 5800000.00 | 1 | 25.0 |
| | 6000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (300 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8200000.00 | 2 | 50.0 |
| | 8600000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (300 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12500000.00 | 2 | 50.0 |
| | 13000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (400 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8000000.00 | 4 | 100.0 |

**Sale value of G+1 (500 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 10000000.00 | 4 | 100.0 |

**Sale value of G+1 (400 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 11000000.00 | 3 | 75.0 |
| | 11500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (500 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 13000000.00 | 4 | 100.0 |

**Sale value of G+1 (400 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 16000000.00 | 3 | 75.0 |
| | 16500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+1 (500 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 18000000.00 | 4 | 100.0 |

**Sale value of G+2 (94 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 2000000.00 | 1 | 25.0 |
| | 2200000.00 | 1 | 25.0 |
| | 2400000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (200 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 4800000.00 | 1 | 25.0 |
| | 5000000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (94 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 3300000.00 | 1 | 25.0 |
| | 3400000.00 | 2 | 50.0 |
| | 3500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (200 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 6800000.00 | 1 | 25.0 |
| | 7000000.00 | 2 | 50.0 |
| | 7300000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (94 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 5000000.00 | 4 | 100.0 |

**Sale value of G+2 (200 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 9800000.00 | 1 | 25.0 |
| | 10000000.00 | 2 | 50.0 |
| | 10200000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (300 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 6000000.00 | 2 | 50.0 |
| | 6200000.00 | 1 | 25.0 |
| | 6500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (300 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 10000000.00 | 1 | 25.0 |
| | 10200000.00 | 1 | 25.0 |
| | 10500000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (300 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14500000.00 | 1 | 25.0 |
| | 15000000.00 | 2 | 50.0 |
| | 15500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (500 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 12000000.00 | 2 | 50.0 |
| | 12500000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (500 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 15500000.00 | 3 | 75.0 |
| | 16000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (500 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 21000000.00 | 2 | 50.0 |
| | 22000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (400 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 9000000.00 | 3 | 75.0 |
| | 9200000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (400 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000000.00 | 1 | 25.0 |
| | 14500000.00 | 1 | 25.0 |
| | 15000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+2 (400 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 19000000.00 | 1 | 25.0 |
| | 19500000.00 | 1 | 25.0 |
| | 20000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (94 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 3500000.00 | 2 | 50.0 |
| Missing | System | 2 | 50.0 |
| Total | | 4 | 100.0 |

**Sale value of G+3 (94 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 5000000.00 | 3 | 75.0 |
| | 5200000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (94 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 6500000.00 | 1 | 25.0 |
| | 6800000.00 | 1 | 25.0 |
| | 7000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (200 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 5500000.00 | 3 | 75.0 |
| | 5600000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (200 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 11000000.00 | 3 | 75.0 |
| | 11500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (200 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 13000000.00 | 2 | 50.0 |
| | 13500000.00 | 1 | 25.0 |
| | 14000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (400 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 10000000.00 | 1 | 25.0 |
| | 10500000.00 | 1 | 25.0 |
| | 11000000.00 | 2 | 50.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (400 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 16000000.00 | 4 | 100.0 |

**Sale value of G+3 (400 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 23000000.00 | 3 | 75.0 |
| | 23500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (300 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 8000000.00 | 2 | 50.0 |
| | 8200000.00 | 1 | 25.0 |
| | 8400000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (300 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000000.00 | 2 | 50.0 |
| | 14500000.00 | 1 | 25.0 |
| | 15000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (300 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 18000000.00 | 2 | 50.0 |
| | 18500000.00 | 1 | 25.0 |
| | 19000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (500 msq) on the year 2014**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 14000000.00 | 3 | 75.0 |
| | 14500000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (500 msq) on the year 2016**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 16500000.00 | 1 | 25.0 |
| | 17000000.00 | 3 | 75.0 |
| | Total | 4 | 100.0 |

**Sale value of G+3 (500 msq) now 2018**

| | | Frequency | Percent |
|---|---|---|---|
| Valid | 25000000.00 | 2 | 50.0 |
| | 25500000.00 | 1 | 25.0 |
| | 26000000.00 | 1 | 25.0 |
| | Total | 4 | 100.0 |

Annex 3: Sample photographs of the study area taken by the researcher

Annex 4: Questionnaires to be filled by sample households and brokers

**Introduction**

This survey is being conducted for the purpose of researching *"the impact of urban land use changes on residential property values: The case of Bole Sub City, Addis Ababa".* For a partial fulfillment for Master's Degree in *"Urban Land and Property Valuation"* from Ethiopian Institute

of Architecture Building construction and City development (EiABC), Addis Ababa University. In this regard, you are considered to be an important respondent and I would like to have your opinion to meet the objective of this study. Please be assured that your privacy is of utmost importance and that your response to the survey will remain confidential. The answers you fill will provide valuable information for this study. I am thankful for your time and patience and highly value your opinion. If you are interested in the result of the study, I will happy to share with you.

I would like to forward my gratitude in advance and would appreciate very much your prompt responses to the following questions.

Degualem Mekuriaw. Addis Ababa, 2018.

***A. <u>Questionnaires to be filled by sample household heads.</u>*** *Please fill in the answer in the blank space or mark in the box.*

**I. Particulars of the respondents**

1. Name of the respondent (if willing) _____.
2. Age: _____.
3. Sex: (A) Male ☐ (B) Female ☐
4. Level of education: (A) Illiterate ☐ (B) Read and write ☐ (C) Primary (1-8) ☐ (D) Secondary (9-10) ☐ (E) Preparatory (11-12) ☐ (F) Higher education (college/university) ☐
5. Occupation: (A) Student ☐ (B) Gov.t employee ☐ (C) Private employee ☐ (D) Self-employed ☐ (E) NGO ☐ (F) other (specify) _____.

**II. Land use changes in the study area**

6. When have you been started to live in this locality? Please write the year _____.
7. What was major land uses in the area when you started to live? Multiple answers are possible.
   A. Farmland ☐
   B. Few Residential ☐
   C. Few commercial ☐
   D. Few industrial ☐
   E. Other use (specify) _____.
8. What was your reason to start living in this neighborhood? Multiple answers are possible.
   A. Availability/supply of land ☐

B. Road construction and transport access ☐
C. Due to physical infrastructure and utility ☐
D. Due to public services and urban amenities ☐
E. Government laws and regulations (land use regulation) ☐
F. Safety and security of the neighborhood ☐
G. The topography of the land ☐
H. Agglomeration of business activities ☐
I. The physical quality of the neighborhood ☐
J. Other (specify) _____.

9. Do you observe any change in land use in the locality in the last four years?
   A. Yes ☐ B. No ☐
10. If yes, what are the major changes in land use in the locality?
    A. Farmland to residence ☐
    B. Farmland to commerce ☐
    C. Farmland to mixed use ☐
    D. Farmland to industry ☐
    E. Farmland to public service and urban amenities ☐
    F. Other (specify) _____.
11. Do you observe any change in property use in the locality in the last four years?
    A. Yes ☐ B. No ☐
12. If yes, what are the major changes?
    A. Residential to commercial ☐
    B. Residential to public service ☐
    C. Residential to mixed use ☐
    D. Residential to industry ☐
    E. Other (specify) _____.
13. When was land use change kicked off in your area? Please write the year _____.

**III. Determinant factors for land use change that affect residential property values and the impacts of such changes on the values of residential properties**

| No. | Variables | It is a cause for land use change | It has brought corresponding change in residential property values | Impact of change on residential property value |
|---|---|---|---|---|
| | | 1. Strongly-disagree<br>2. Disagree<br>3. Neither<br>4. Agree<br>5. Strongly-agree | 1. Strongly-disagree<br>2. Dis agree<br>3. Neither<br>4. Agree<br>5. Strongly-agree | 1. Strongly-decrease<br>2. Decrease<br>3. Neither<br>4. Increase<br>5. Strongly-increase |
| 14. | Road construction & transport access | | | |
| 15. | Infrastructure/utility development | | | |
| 16. | Safety and security | | | |
| 17. | Housing demand | | | |
| 18. | Public service and urban amenity | | | |
| 19. | Agglomeration of business activities | | | |
| 20. | Physical quality of the neighborhood | | | |
| 21. | Land use regulation/supply of land | | | |
| 22. | Topography | | | |

23. What other major factors do you think are responsible for land use change in your area?

_____

_____.

24. What other major factors do you think are responsible for residential property value change in your area?

_____

_____.

25. What might be major challenges in relation to residential property valuation in your area?

_____

_____.

26. Possible suggestions you recommend

_____

_____.

27. Any other comments to add

_____

_____.

***B. Questionnaires filled by sample brokers.*** *Please fill in the blank space or mark in the box.*

**I. Particulars of the respondents**

28. Name of the respondent (if willing) _____.
29. Age: _____.
30. Sex: (A) Male ☐ (B) Female ☐
31. Level of education: (A) Illiterate ☐ (B) Read and write ☐ (C) Primary (1-8) ☐ (D) Secondary (9-10) ☐ (E) Preparatory (11-12) ☐ (F) Higher education (college/university) ☐
32. Occupation: **Broker**

**II. Land use changes in the study area**

33. When have you been started to work in this locality? Please write the year _____.
34. What was major land uses in the area when you started to work? Multiple answers are possible.
    A. Farmland ☐
    B. Few Residential ☐
    C. Few commercial ☐
    D. Few industrial ☐
    E. Few social service ☐
    F. Other use (specify) _____.
35. Do you observe any change in land use in the locality in the last four years?
    A. Yes ☐ B. No ☐
36. If yes, what are the major changes in land use in the locality?
    A. Farmland to residence ☐
    B. Farmland to commerce ☐
    C. Farmland to mixed use ☐
    D. Farmland to industry ☐
    E. Farmland to public service and urban amenities ☐

F. Other (specify) _____.

37. Do you observe any change in property use in the locality in the last four years?

A. Yes ☐ B. No ☐

38. If yes, what are the major changes?

A. Residential to commercial ☐

B. Residential to public service ☐

C. Residential to mixed use ☐

D. Residential to industry ☐

E. Other (specify) _____.

39. When was land use change kicked off in your area? Please write the year _____.

**III. Determinant factors for land use change that affect residential property values and the impacts of such changes on the values of residential properties**

| No. | Variables | It is a cause for land use change | It has brought corresponding change in residential property values | Impact of change on residential property value |
|---|---|---|---|---|
| | | 1. Strongly-disagree<br>2. Disagree<br>3. Neither<br>4. Agree<br>5. Strongly-agree | 1. Strongly-disagree<br>2. Dis agree<br>3. Neither<br>4. Agree<br>5. Strongly-agree | 1. Strongly-decrease<br>2. Decrease<br>3. Neither<br>4. Increase<br>5. Strongly-increase |
| 40. | Road construction & transport access | | | |
| 41. | Infrastructure/utility development | | | |
| 42. | Safety and security | | | |
| 43. | Housing demand | | | |
| 44. | Public service and urban amenity | | | |
| 45. | Agglomeration of business activities | | | |
| 46. | Physical quality of the neighborhood | | | |
| 47. | Land use regulation/supply of land | | | |
| 48. | Topography | | | |

49. What was your reason to start work in this neighborhood?

_____

_____.

50. What other major factors do you think are responsible for land use change in your area?

_____

_____.

51. What other major factors do you think are responsible for residential property value change in your area?

_____

_____.

52. What might be major challenges in relation to residential property valuation in your area?

_____

_____.

53. Possible suggestions you recommend

_____

_____.

54. Any other comments to add

_____

_____.

Annex 5: Interview guide questions for brokers, households and sunshine real estate

**I. Rental and capital values of residential properties over time ( for brokers and sunshine)**

| Type of residence | Subdivision | Value (birr) In 2014 G.C | | Value (birr) In 2016 G.C | | Current value (birr) 2018 G.C | |
|---|---|---|---|---|---|---|---|
| | | Sale | Rent | Sale | Rent | Sale | Rent |
| | 2 Bed Rooms | | | | | | |
| | 3 Bed Rooms | | | | | | |
| Single-family single-story (G+0) | 105 $m^2$ | | | | | | |
| | 150 $m^2$ | | | | | | |
| | 200 $m^2$ | | | | | | |
| | 250 $m^2$ | | | | | | |
| | 300 $m^2$ | | | | | | |
| | 350 $m^2$ | | | | | | |
| | 400 $m^2$ | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 450 $m^2$ | | | | | | |
| | 500 $m^2$ | | | | | | |
| Single-family multi-story (G+1) | 105 $m^2$ | | | | | | |
| | 150 $m^2$ | | | | | | |
| | 200 $m^2$ | | | | | | |
| | 250 $m^2$ | | | | | | |
| | 300 $m^2$ | | | | | | |
| | 350 $m^2$ | | | | | | |
| | 400 $m^2$ | | | | | | |
| | 450 $m^2$ | | | | | | |
| | 500 $m^2$ | | | | | | |
| Single-family multi-story ( G+2) | 105 $m^2$ | | | | | | |
| | 150 $m^2$ | | | | | | |
| | 200 $m^2$ | | | | | | |
| | 250 $m^2$ | | | | | | |
| | 300 $m^2$ | | | | | | |
| | 350 $m^2$ | | | | | | |
| | 400 $m^2$ | | | | | | |
| | 450 $m^2$ | | | | | | |
| | 500 $m^2$ | | | | | | |
| Single-family multi-story ( G+3) | 105 $m^2$ | | | | | | |
| | 150 $m^2$ | | | | | | |
| | 200 $m^2$ | | | | | | |
| | 250 $m^2$ | | | | | | |
| | 300 $m^2$ | | | | | | |
| | 350 $m^2$ | | | | | | |
| | 400 $m^2$ | | | | | | |
| | 450 $m^2$ | | | | | | |
| | 500 $m^2$ | | | | | | |

Annex 6: Guidelines for key informants

***Interview guide questions for professionals (urban planners, property valuers), real estate developers and brokers***

## I. Urban land use change and residential property values

1. When was *land use change* kicked off in your area? The year……..
2. What are *major land use changes* in your area?

Such as residential, commercial etc. ……

3. What are *major causes of land use changes* in your area?

   Such as road construction and transport access, government laws and regulations (land use regulation) etc. ……..

4. How these land use changes affect residential property values in your area? Both rental and sale value.

   E.g. road construction and transport access increase residential property value etc. ……...

5. What might be major challenges in relation to residential property valuation in your area?

   E.g. Brokers interference……..

6. Any other comments…….

Annex 7: Data collection format for rental values (regression analysis)

This question is prepared for the purpose of estimating *"the impacts of land use change on rental values of single family residential properties with regression analysis".*

1. Distance (in meter) from the main road/transport corridors (a road from CMC roundabout to Summit through Safari roundabout and a road from Safari round about to Sahalite Mihret)?
2. Whether the tenant rents the property as a result of the increases of demand (1 = yes and 0 = if not))
3. Whether the property is located in a good quality of block layout and street network .i.e. accessible plots and constructed roads (1 = yes and 0 = if not)?
4. Whether the property is safe and secure i.e. fence, no crime, street lighting (1 = yes and 0 = if not)?
5. Whether there are different business activities within 100 meter distance from the property i.e. shops, cafes, super markets etc. (1 = yes and 0 = if not)?
6. Whether the property is regulated by the city/local development plan i.e. title deed (1 = yes and 0 = if not)?
7. Whether the property has basic utilities i.e. water, electricity, sewerage (1 = yes and 0 = if not)?
8. Distance (in meter) from public services i.e. educational service (1 = yes and 0 = if not)?
9. Whether the property has a gentle slope (1 = yes and 0 = if not)?
10. Whether the tenant rents the property with the intervention of broker (1 = yes and 0 = if not).
11. Whether the property has under collateral (1 = yes and 0 = if not).

Annex 8: Data collection format for affected residential properties

This question is prepared for the purpose of estimating *"the market value of affected residential properties on the date of valuation with appropriate valuation techniques".* The following questions are prepared for both subject and comparable properties.

✓ **Physical characteristics**

1. Location = _____.
2. X, Y coordinate = _____.
3. Total area (width and length) = _____.
4. Built up area = _____.
5. Parcel shape = _____.
6. Topography = _____.
7. Land use = _____.
8. Story (height) = _____.
9. Construction material = _____.
10. Housing condition = _____.
11. Housing typology = _____.
12. Architectural style = _____.
13. Age = _____.
14. Number of rooms = _____.
15. Availability of public utilities = _____.
16. Site improvements = _____.
17. Legal characteristics (title deed) = _____.
18. Form of ownership (leasehold, freehold) = _____.

✓ **Economic characteristics**

19. Potential income/month; in the year 2016 = _____.
20. Potential income/month; in the year 2017 = _____.
21. Vacancies (bad debts)/month; in the year 2016 = _____.
22. Vacancies (bad debts)/month; in the year 2017 = _____.
23. Potential expenses/month; in the year 2016 = _____.
24. Potential expenses/month; in the year 2017 = _____.
25. Transaction date = _____.
26. Transaction condition = _____.
27. Transaction price (sold price) = _____.