



Mekelle University

INSTITUTE OF GEO INFORMATION AND EARTH OBSERVATION SCIENCE

DEPARTMENT OF GEOINFORMATICS

TITLE: INTEGRATED APPLICATION OF GIS AND HEDONIC PRICE MODELING (HPM) FOR PROPERTY VALUATION OF BUILT-UP AREAS IN MEKELLE CITY, TIGRAY, ETHIOPIA.



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ABSTRACT

Property valuation plays a crucial role in asset building, environmental resource mobility, and for creation of digital society in the daily life. It significantly contributes to property administration, social equity, and economic stability, while impacts socio-economic, political, cultural, and environmental sustainability. Upon that, accurate and fair property valuation is essential. However, unlike developed countries, property valuation has under numerous challenges in our country. The objective of this study was to identify high property value variations in similar properties through analyzing of existing valuation system. Using a descriptive research design with mixed research data approaches, the study examines factors influenced property values using integrated modeling and mapping for validation and triangulation of the data in social survey. Simple random sampling has used for resident perceptions, while purposive sampling used for expert and official informants through interviews, questionnaires, and group discussions. Additionally, direct field observations conducted. The findings revealed that 99% of respondents are aware of property valuation, with 82% of residents, 33% brokers, and 84% of sectorial respondents involved in property transactions. Residents primarily used transaction 80% for residential houses and 61% for taxation and 20% for remaining listed valuation purposes. While 76% of sector respondents apply scientific valuation methods, only 24% (23% MHSC, 60% Banks, and 13% MMCA & RLRAIB) do so regularly. About 61%, cost approach is predominantly used, 13% income and 27% mixed approaches. For the approved building property nature appraised using 80% of cost approach, shows the valuation practices has not well built. Even through, the value variation in similar properties feedback looks like this 97% HMSC 89% brokers, 56% residents, 52% MMCA & RLRAIB and 26% banks. However, multiple cross validation of overall target group of respondents' averagely proven via FGD about 92% have well understood and agreed with the value variation. Economic impacts of value variations range from 36.5% in 1,000,000s to 27% in less than 1,000s, highlighting significant discrepancies. 85% of study results show high valuation and 76% have of these have from 10,000s'to 1000, 000s' price difference roughly. Key informants indicated that the residents done with discrepancies of varied official and actual sales notification. Banks used manuals to prioritizing risk security first, while MMCA & RLRAIB focus on the regulatory system of valuation in higher hierarchy level. Residents' dissatisfaction stems from unfairness and lack of transparency. The aim of this study is to address these issues with located the building value using GIS and to model the characteristics property of attribute using HPM to conduct the accurate value with appropriate valuation practices. This have significant role to advance the existed system of property valuation in standardized and comprehensive approach.

Key words: Building Property, Built-Up Areas, HPM, Modeling, Property, Property Valuation, Property Transition and Similar Property

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ACRONYMS

EMUDC- Ethiopia Ministry of Urban development and construction

GIS – Geographic information system

HPM – Hedonic Price Model/Method

HSC – Hadinet Sub-City

IFRS – International Financial Reference Service

IVS – International Valuation Standards

IVSC- International Valuation Standards Council

LIS – Land Information System

MHSC = Municipality of Hadinet Sub-City

MMCA = Municipality of Mekelle city Administration

MRAM = Multiple Regression Analysis Methods

POP = Property Owner and Possessors

PrBr = Property Brokers

RICS = Royal Institution of Chartered Surveyors

RIPT = Residents Involved in Property transaction

TLRA = Tigray Land and Related Agencies

T/RLRA = Tigray/Regional Land and Related Agencies and Investment Bureaus

RLRA = Regional Land and Related Agencies

Chapter - One

1. Introduction

1.1 Background of the study

The rapid urbanization and population growth of nations depicts exponential in increasing rate. This is the cause to make the towns and cities complex for property administration especially land property management industries (Kaifang Shi, 2023). The appropriate practices of technological tools and application of update property management affects society's living environment in one or different cases. The property valuation needs such implementation to assess every seconds because of the property have continuous bring up-to-date to reduce the problems rose on different value related property transaction (Gopal M, 2011)

The purpose of the valuation depends on the valuation approaches and method of analysis. Because of this, many problems related to the completeness and accuracy of the valuation system (Blackledge, 2009). Property valuation models been ignored the spatial character of real properties for decades. Omitting geography often expressed in both, the modeling techniques as well as the data input for the model. GIS technologies facilitate spatial regression models that account for spatial errors (J.A.D Odu, 2017)

According to the one property valuations book that the possible reasons for property appraisal for develop or redevelop. Using valuation models to estimate market values have the time of assessment and model specification differences. Although time is predominantly a legal constraint and technological model constraint (Blackledge, 2009). The mass appraisal has impactful technique to reduce the current technological constraints based on the extent and quality data of statistical assessment steps. (Elfrid, 2015).

Property valuation has continuous, complicated and difficult to manage easily. For this reason, it requires experienced, skilled and knowledgeable professionals. For Over the last 20 years, property valuation has evolved from traditional manual sales comparison methods and subjective appraiser assessments based on comparable evidence, into mechanically oriented valuation models (IVSC, 2017). Because of this, advanced and integrated application have looking for better property management practices; the GIS data administration application, ground surveying, remote sending data, Statistical data (tabular data), property valuation approaches

and other helpful conceptual entities professional expert for complete, Consistent, effective and efficient property valuation outcomes. Finally, most of the studied work-done incorporation of location based investigation of valuation practices. For instance, in many research, projects that face these challenges include the hedonic modeling with location, artificial neural networks, Accessibility Index and similar so many others. All of these activities are not fill the up-to now looking for new, more efficient and accurate location based valuation (Katerina Christopoulou, 2006).

The GIS based property identification using the Hedonic Price Model to consider characteristics of the property using statistical integrated for this research paper. The value of the plots would determine by hedonic pricing model (HPM) method of valuation while GIS employed to over the spatial and non-spatial techniques (Stephen W. Gatheru, 2015). It is significant to moderate the gab among the global and local application of property valuation makes difference that cause for multiple socio-economic, environmental and political crises. Because, the profession and the system as well have incredible role to measure, mitigate and balance the value of every properties based on purpose, type, status, size and other marginal values of present. The model introduce by (Rosen, 1974) which is Hedonic price model have best attraction to pay based physical and non- physical of each characteristics property value.

Accordingly, successful application of a valuation method is heavily dependent on the quality and the variety of the data. Based on the study value of property have affected by the factors such as legal, physical, economic, location considered to be of outmost importance. Location is an important factor to determine the relationship of urban amenities or facilities (neighborhood, topology) have great role in formation of values but it is too complex. Therefore, it generates variations in price among similar properties. Although, the importance of location in the value of the property widely recognized, current valuation processes consider location implicitly. This is mainly due to the modeling difficulties that relate to the wide variability of spatial factors and their interactions that may or may not affect the property in question at given instances of time. Property valuation have tremendous role for socio-economic, political, environmental and other international context of intellectual property development and management. However, it is complicated and multivariable nature of the real property makes difficult and unable to address all property related problems by the previously done researches. However, the advancement of the technology the application of helpful tools and advance the analysis mechanism is strongly

recommending in different studies to solve problem of property valuation through systematic, procedural and tactical means of property appraising.

According to this, property valuation is versatile real estate application and an important field of study focused on real property the land development and management. This uses to have fair value of sellers and buyers, commercial and residential house rents, local government taxation, real estate appraiser, legal property transaction and compensation purposes. This property management demands critical spatial data and non-spatial data analysis to integrate the socio-economic, political, environmental and other data uses GIS for managing and displaying towards appropriateness of the property valuation system.

Consequently, in Ethiopia particularly in Tigray the effective use of land resource have a lot of drawbacks have facing related to land resource management and valuation system this indicates absence or incompleteness of available data access and exercising poor or nor effective enough methods of analysis. This is the main case of property unfair and unbalanced property valuation similar built-up properties. There are many factors affect property value these reasons for devaluation such as. Location, use value, size, and purchasable market condition. Other researcher defined as 'Location, Location, Location' land value analysis in wider sense.

1.2 Statement of the problem

Property valuation is inherently complex due to the absence of central sale registration databases and the confidentiality of data obtained from respective bodies (Dixon, 1992). This complexity, with its multitude of characteristics, demands trained and experienced professionals capable of producing accurate, reliable, and acceptable property values (Stephen W. Gatheru, 2015).

In Ethiopia, property valuation remains rooted in traditional methods with limited capacity among Valuers, often lacking scientific methodologies and comparable property data (Belachew, 2020). This leads to inaccurate and unfair valuations, compounded by factors such as location, data updates, and property quality (MUDC, 2019).

Recent property valuation research in Ethiopia is sparse, focusing primarily on taxation and compensation with incomplete data and procedural inconsistencies. These challenges have led to exponential increases in land and building values and extreme price variations for similar properties within the same market environments. Consequently, this backward practice undermines market liquidity, property quality, and economic stability.

The backward practice of property valuation systems significantly prejudices the overall economy of the community by impeding access to information regarding buying and selling, renting real property and other transaction under different valuation purposes. In Tigray, the issues have closely tied to land development, property management, market value transactions, and high value variations among similar properties. This necessitates urgent investigation and solutions to assess fair value and implement scientific methods in property valuation.

Using suitable technology and models is crucial for accurate property allocation and mapping. GIS technology is particularly effective in identifying and representing problem-solving and decision-making systems for built-up area features. The Hedonic Price Model (HPM) emphasizes the relationship between estimated prices and existing market values based on property characteristics (Rotimi Boluwatfie, 2017).

However, modern property valuation in Tigray faces challenges, especially in the efficient use of land systems. These challenges include adopting scientific valuation approaches, developing systems in alignment with existing practices, establishing a central property data bank and employing qualified experts. Recognized property price benchmarks and appropriate tools and models are also essential.

Given data availability, time, and budget constraints, this study focuses on the issues of built-up property valuation for similar properties in the same planned zone, which are currently subject to ambiguous, unfair, and imbalanced appraisals. Previous research highlights gaps in spatial representation, statistical regression analysis, and the use of hedonic pricing models. These issues require urgent and intensive solutions due to the continuous and complex nature of property valuation.

Therefore, the currently the urban property administration deserves highly significant attentions. Under this urgent solution concerned of advance and suitable land resources and related property administration throwing to multiples life vulnerabilities. This study aims to address basic problems and provide directions to improve property valuation systems. The goal is to identify the impact of traditional valuation and it consequences of high value variation in similar building property in built up areas under the integrated application of scientific valuation system, essential models GIS and HPM applications, and statistical tool analysis for enhancing the property valuation systems to advance level.

1.3 Objective of the study

1.3.1 General objective

The main objective of this study conducted to identify the existed property value variation in similar property of built-up areas using integrated application GIS and HPM.

1.3.2 Specific objective

1. To examine methods of property valuation in the study area.
2. To examine the property value variations in similar built-up properties.
3. To assess the major factors causes for the property value variation.
4. To specify building property transacted with high value variation using GIS and HPM.

1.4 Research questions

1. How to examine methods of property valuation in the study area?
2. How to level the value variations in similar built-up properties?
3. What are the major factors leading to value variation in the study area?
4. How to specify the buildings property transacted with high value variation through integrated application of GIS& HPM?

1.5 Significance of the study

This study has a vital role on creating a base for different socio-economic, administration and resource mobility. However, primary significance has been defined as follows.

- ✓ The study has a great role for academic purpose as a reference for scientific researchers and guidance as teaching materials helps the experts to collect necessary practical experience, technical skills and knowledge to exercise the modern system of property valuation.
- ✓ It has an important role for the community in awareness creation about the values of their property. The society has a lack of understanding to acquire the required value for their equivalent property. Therefore, this study will be providing basic concepts and thoughtful direction to complain when devaluation is happening.
- ✓ The locally low awareness over property profession and limited number of professional experts have a huge negative impact which has not been practiced in a scientific way overall the developing countries including Ethiopia. This study must be a role-player for professionals and the profession would play a great role over socio-economic development and address fair wealth distribution.
- ✓ The study has to contribute for financial institutions and other sectors to shape the property valuation system toward the advanced global trends.

1.6 Scope of the Study

The spatial scope of the study is Mekelle city, Hadinet Sub-City. The study area has been selected based on the concern of data access, the study focus, nature of the property and problems variety and equally distributed about valuation shortcomings represent in every sub-city. The sub-city land use has included the overall land use grade and pattern.

The thematic scope of the study focuses on built-up or building properties to solve the existing problems, because many researches have done related property valuation for different purposes. However, the valuation on built-up area that is highly exposed to poor valuation exercise and not researched yet. The complication nature, absence of technology and distribution of property valuation problems in overall the city have similar distribution. The difference was the main cause, its degree and the location placed the problem due to difference in characteristics of the property valuation system. This is the reason to choose only one specific sub city. This study is restricted too in built-up area that the misleading the proper and modern property management is

affecting the real estate industry development and property speculation directly influenced the benefits of the community that generates fair and equivalent value for their property.

The modern cadastral surveying and land registration system formally pilot project introduced around 2006 (Fantahun, 2022). The time scope and basic input data applied for this research study from 2011 to 2020 G.C with the 10 years' time range. Because, registration and definition every real property description, boundary, right and values are basic task to facilitate property valuation. It needs time to produce the results of up on the commencement. Even though it is not complete, it supports as a benchmark for more urbanization stages of developments. That is all about the basic concept that the time scope became at this range intentionally.

In general, this research has short like investigation term, limited time-period and tighten up set schedule to finish. This is due to very short study period of programs, insufficient time schedule, limited monetary funds and the continuity of the as a result of the past years disastrous situations.

1.7 Limitations of the Study

It was very difficult to find the community target group who was the property owner and possessor or seller and buyers. The action took to solve for this challenging issue was almost all the data collection instrument applied in justice office and municipality. This helped me to find the buyer and seller or other mean of exchange agent there for approval and agreement.

This research study required accumulation, registered property and boundary survey data. These made to find up-to-date, complete, and accurate property data of price benchmark, land value, sale of comparable property and legislation to compile the relevant evidence. This prone to spent more time and cost to investigate further evidences exposes to extra transport cost and carried out the unstable situation. Over all this limitation came due to the backward property administration and lack of technological supported system. I have gone further for general offices and similar office with shared documents to solve it.

Even though, almost of the expert have doing by adoption the system rather than the skill, knowledge and experience that employed who they thought by closed discipline. Therefore, it was very complication way of practical, conceptual and documentation barrier in the offices and institutions to obtain supportive data. To do this around two months consistently and persistently to contact respondents in physical, call and social-medias. Mainly, it have very difficult to attain the property transaction made individuals and real sale data of building property to collect data

from the essential sources of data availability faced to this challenge collect the price benchmark of land, of comparable property and legislation. Finally, though experts' direction for corresponding individuals and attending the private consultation offices and justice office have mainly provides two advantages to find the real sale data and the both property exchange clients came to authorize their agreement.

Instruments to collect ground survey data GPS was mandatory for coordinate establishment but due to the highly cost and environmental insecurity. Most documents were destruct and burned that made difficult to collect sufficient and relevant data was time consuming. During the complicated situation that solved after long-run long time personal, stakeholders and institutions delight efforts. Even through, the situation was puzzling (Pandemic COVID and Ruinous War) it collects relevant data investing further to face the challenging condition to obtain complete and evidence for better replicable work.

At the beginning, the study was intended to conducted as project in automated digital system however the budget was not allow and insufficient to realize the project that proceed to improve the system through scientific and manual approaches.

Even though, the data collection begun in April 2021 that completed after three years beginning from August 2023 while improved the catastrophic war situation in Tigray. I have made vital and intensive data collection efforts, tools and procedures to gather appropriate evidences useful to collect relevant data using questionnaires, interview and wider focus group discussion and field survey (observation and ground measurements). The respondent of the corresponding target population was exciting to provide overall necessary information and supports.

1.8 Organization of the study

The research study has organized in five chapters; Chapter-one includes introduction, statement of the problem, objectives, study scopes, significance of the study, and limitation of the study and organization of the study. Chapter-two includes the definitions of terms, conscience similar study review, scientific concepts about study, gab analysis and empirical of the study. Chapter-three deals about research methodology that includes justification of study area, research design, sampling methods and data collection techniques, data analysis and interpretation and research conceptual design. Chapter-four contains the detail about research findings and discussion. Chapter-Five; this chapter contains the research conclusion and recommendations.

Chapter – Two

2. Literature reviews

2.1 Definition of important terms

Valuation: The valuation is an art and a science of conceptualization and computing the property valuation. The scientific part of valuation is the analysis of data and, the mathematical calculation of data; the art is the skill of knowing which information to use to assist valuation and the process of making judgments and forming opinions (Ling D.C, 2005)

Property Valuation: the process of identifying and quantifying those “value factors” and the result should be an informed opinion of value based on an assessment of those factors considered relevant to the value of the subject property (Wyatt P. , 1995).

Or

Property valuation is the systematic procedure that an appraiser follows to estimating value of property based on opinion value to provide answer to clients question about real property valuation (Instutute, 2001).

Value: based on the valuation concept value usually defines economic worth of the given time and specific property to the buyers or sellers’ goods and services for exchange, investment and use values in different time variable (David, 2002). The appraisers use the word value with Market value, use value, investment value, assessed value and other specific kinds of value (Ling D.C, 2005)

Appraisal: the written provision of a valuation, combined with professional opinion, advice and/or analysis relating to the suitability technique follows to estimate the value using operational and conceptual footsteps (IVSI, 2009).

Valuer or Appraiser refers to an individual, group of individuals or a firm who possesses the necessary qualifications, ability and experience to execute a valuation in an objective, unbiased and competent manner. In some jurisdictions, licensing is required before one can act as Valuers (IVSC, 2017).

Hedonic Price Model (HPM): The Hedonic pricing method places emphasis on the relationship between selling price and attributes for estimating values of properties (Monson m., 2009).

Map Value: the functionality of a GIS means that a value map need not be a static display but can form part of a more analytical process. Problems in the past related to a lack of staff resources, the production of expensive paper maps and the complex calculations involved. A GIS can manage data input calculations and the presentation of the results the value that GIS might offer Values by giving a spatial dimension to their information (Dixon, 1992).

Similar Property: refers to real estate that shares comparable characteristics in terms of physical entity or market behavior such as location, size, style, age and more features with other property (Friedman J. P, 2010).

Real estate: refers to land and any physical property attached to it including improvement encompasses all rights and interests like buildings, homes and other with its right to develop the land and exchanges (Miller, 2007).

Transaction: the processes of selling and buying real estate provide insight data related to market value and trends that includes various type purchases, leases, or exchanges (IVSC I. V., 2021).

Built-Up Areas: refers to developed land consists where construction has occurred; indicate the land utilized for human settlement and activities like building rather than for agricultural land (B.D.A.A.K & Wong, 2014).

Building Property: refers to the physical structure where real estate been located that including the building itself and it improvement, like fixtures and landscaping (Floyd, 2015).

2.1.1 Overview of the literature review

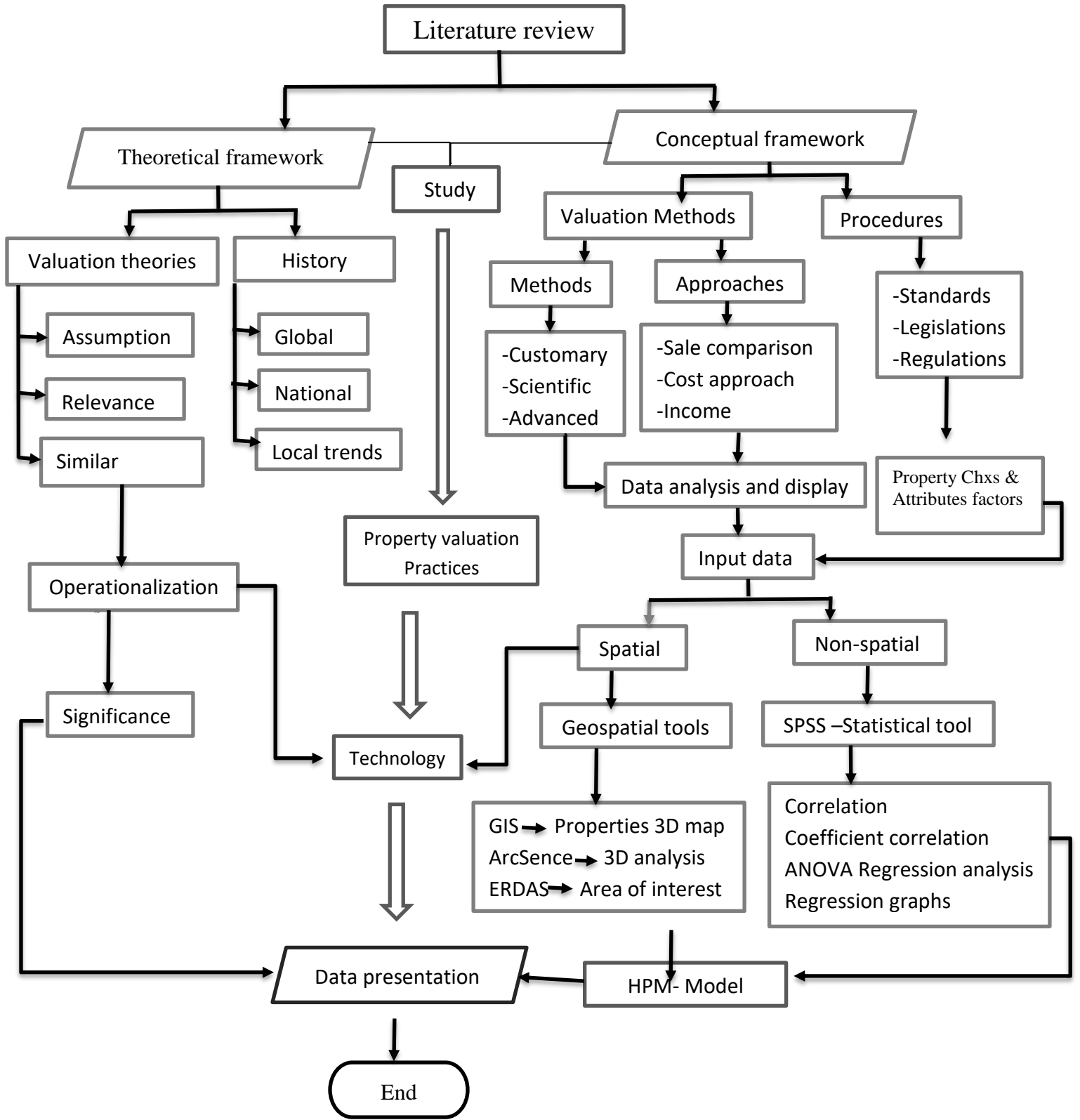


Figure2. 1: Framework of the literature review

2.2 Theoretical literature review

2.2.1: Global trend of property valuation practices

Property valuation is an art and science that demands numbers of case laws and technological inputs. Technologies such as Geospatial information system (GIS), Artificial Intelligence (AI), Building Information Model (BIM) and machine learning have arguing the impact of property value determination (Sara, 2024). Accordingly, similar review of GIS based property valuation in England by Peter Wyatt (1995) stated that two factors the valuation complicated; (a) the absence of a central information system document about the comparable sales and the mandated on with information certainty. (b) In needed to improve authorized body should be taken action to make property data more manageable and organized form publicly available. This is demanded well-trained professionals; aware community property market information enhances the mobility of people and budgetary funds allow with better valuation methods to be developed. The multivariable characteristics and composite actor's natures of the property valuation make that difficult and often subjective task that is dependent on a high degree of experience and local knowledge, for example the heterogeneity of each interest, economic influences at the national, regional and local scales. The researcher tried to minimize the property complexity of these challenging characteristics to improve data accessible and dissemination. "Confidentiality clauses and the inaccessibility of government data are two artificial barriers to data exchange within a property market that is naturally complex and diverse. A lack of data is thus a significant factor affecting the operation of valuation methodology (Wyatt P. , 1995).

In the same hand here, location is determinant factor on property valuation and suitable for geographical knowledge discovery as it justified two core conditions. Firstly, it is a 'non-trivial' process. Today appraiser considered location using the particular geographic area, experience and comparably known value of similar property within that area. In addition, different study on computer-based valuation models incorporated with location follows oversimplifying approaches. This data-driven approach, which is disparate to the scientific theories (E.g. Hedonic Price Modeling) that explains about the role of the location on the property value but not priori the variable assumption (Katerina Christopoulou, 2006).

This paper done using the computer-assisted approach of property valuation demonstrated spatial data mining and knowledge discovery applied in complex problems to reveal previously

unknown information. To develop explicit and accurate location based valuation models difficultly appeared since the valuation process involves the Valuers particular knowledge and experiences. For the representation of geographical data faced number of challenges to solve existed problem (Katerina Christopoulou, 2006). From those, modification of existing or the development of new algorithms that can handle spatial data, the storage and representation of the extracted Knowledge of spatial databases and further incorporation into modeling, the role of visualization model in such a methodology and also the mining of disparate and different in format, data (Koperski K., 1998).

This property valuation paper conducted considering the suitability for development, re-improvement, may be required for different reasons. These may include advice on loan security, acquisition, sale, valuation of options, capital taxes, planning purposes and appraisals. This paper considers on the existed or new developed building only. The valuation approaches applied for this developed area is the sale comparison approach and residual method (cost of development - land values). To select the appropriate valuation practice both or either approaches it depends upon to which degree of relevance and considered nature of development and complexity of property. Valuation using comparison approaches is essentially objective, in that based on an analysis of the price achieved for sites with broadly similar development characteristics. In contrast, the residual method relies on an approach that is a combination of comparison and cost and it requires the Values to make a number of assumptions – any of which can affect the outcome in varying degrees. In this review, the goal of the study guides values to use for development land valuation, which is specific and unique site application only. Therefore, it requires high level of experience, knowledge to undertake the valuation competently, and recognize that assistance must needed from other professionals (RICS, Valuation development land, 2008) . The selection of appropriate valuation approach is the responsibility of the Valuers. The approach should clearly state in the valuation report. The defined the relevant valuation approach with considered number and nature of assumptions should agree in advance the customer (RICS B. , 2019).

2.2.2 Property valuation practice in African context

Property value conducted for the purpose of tax valuation is to provide a basis for distributing the burden of property tax. It requires only a determination of relative value of properties at a common point of time. In mass appraisal many people work on the process and this requires synchronization of both task and appraisal judgments. It requires standardized procedures across many properties. Thus, valuation models developed for mass appraisal purposes must represent supply and demand patterns of group of properties rather than a single property. Valuation accuracy can be improve through 'mass appraisal', which is formula-driven valuation method that minimizes reliance on the judgment of values and the honesty of taxpayers (Dirrilnger, 1992)Mass appraisal techniques emphasize equations, tables, and schedules, collectively called models constructing such models can be viewed as a two-step process i.e. specification of the basic model structure and model calibration. Property valuation is the process of identifying and qualifying the value factors. The property characteristics, location, construction cost, rent, sale price etc. are factors, which contributed to the valuation. The collection and analysis of these evidences of values are crucial to accurate property values and thus an effective assessment system. Comparable evidence is fundamental to all valuation methods. A lack of data is a significant factor affecting property valuation (Wyatt P. J., 1997).

The determination of the property tax depends on the correct, appropriate and up-to-date information and data on property. In present system, the main data for valuation come from taxpayer returns and field survey. In these processes, large amount of spatial and non-spatial data handling should require. However, there lack of legal procedure to obtain accurate quality and quantity of data used have a drawback. As a result, the property tax is associated with the fact that the assessed value is an imperfect estimate of the annual rental value, based on outsourced limited information. Consequently, the valuation system is confusing in individual cases, particular in case of owner occupying houses, especially in areas with few comparable prices. Therefore, a need felt to use an assessment procedure that reduces such risk. However, property valuation, requires a wide range of data (such as cadaster, land use, building) from different sources, collected and maintained independently in different departments or organizations. However, in the present assessment system, it is not possible to identify, qualify and quantify all available information from different sources and keeping it up to date. Therefore, in this research, the aim is to develop a valuation procedure for residential property tax assessment in

GHMC within mass appraisal system using GIS, which can integrate process and update a large amount of data from different sources (Gopal M. Naik, 2011).

2.3 Conceptual literature review

Property valuation/property appraisal is the act or the process of developing an opinion of property value. It involves selective research into appropriate market areas, assemblage of pertinent data, and the use of appropriate analytical techniques, the application of knowledge, experience and professional judgment to develop value opinion. It is not simply a mathematical process. It is much more than that, and probably the larger part of the valuation process depends upon the appraiser forming opinion. The appraiser has to look at a wide range of facts and try to predict the future (Appraisal Institution, 2020).

Valuers or appraisers are not required to use more than one method for the valuation of an asset, particularly when the Valuers has a high degree of confidence in the accuracy and reliability of a single method, given the facts and circumstances of the valuation engagement. However, Valuers should consider the use of multiple approaches and methods and more than one valuation approach or method should considerer and may use to arrive at an indication of value, particularly when there are insufficient factual or observable inputs for a single method to produce a reliable conclusion. Where more than one approach and method is used, or even multiple methods within a single approach, the conclusion of value based on those multiple approaches and/or methods should be reasonable and the process of analyzing and reconciling the differing values into a single conclusion, without averaging, should be described by the Valuers in the report.

Property valuation has consideration must for applying the relevant and appropriate approaches. There are three approaches, which described and defined below are the main approaches used in valuation. There are all based on the economic principles of price equilibrium, anticipation of benefits or substitution. The principal valuation approaches are: (i). Market approach, (ii) Income approach and (iii) Cost approach (Ling D.C, 2005).

2.3.1 Conceptual diagram of Property valuation process

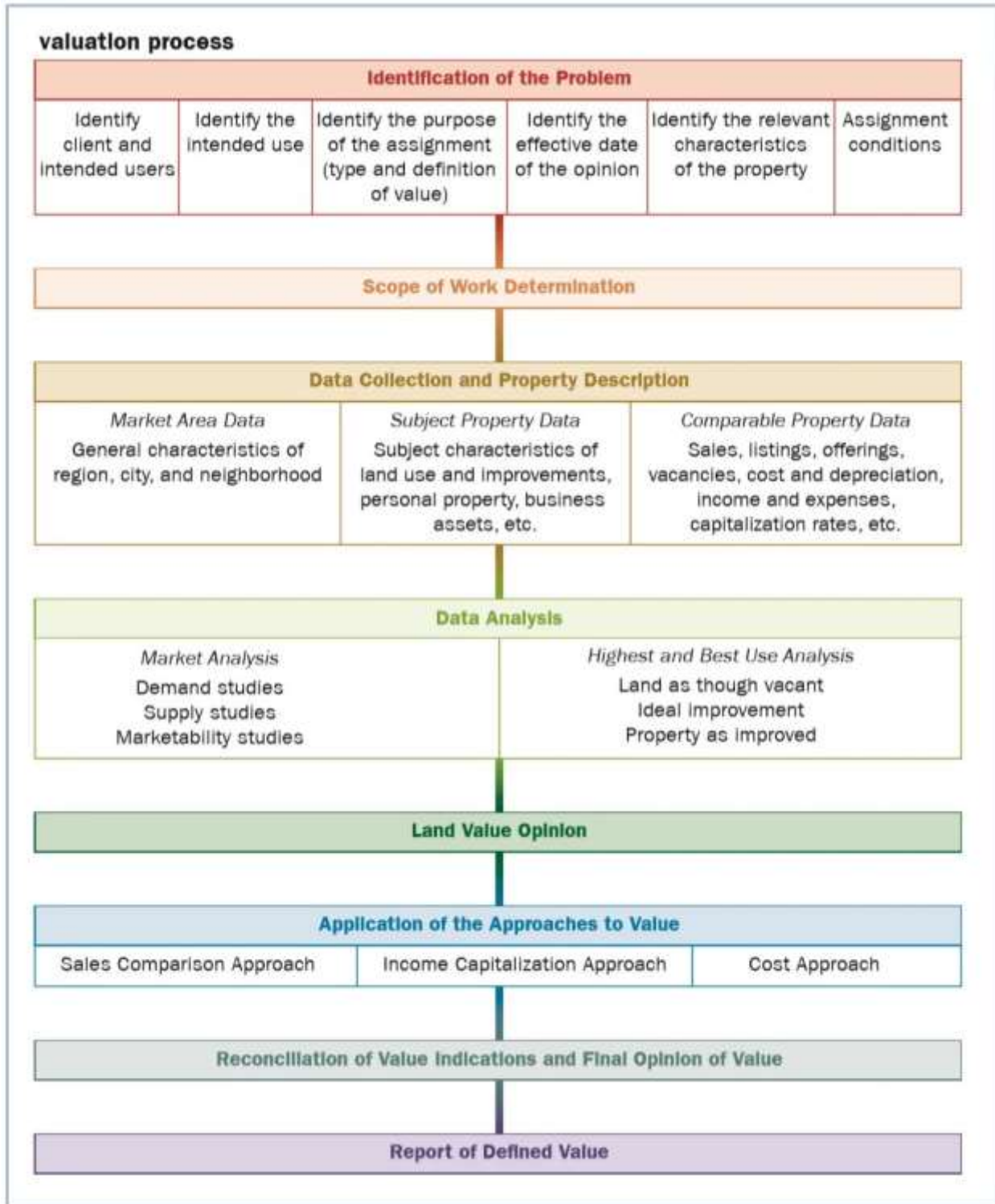


Figure 2. 2: Property valuation process flowchart

Sources: (Edward J. Batis & Associates, 2024)

2.3.2 Comparison sale Approach

Sales comparison approach is a valuation technique in which the value of the subject property is determined by comparing the properties recently sold in the market to the subject property. In this approach, it assumed that the subject property would sell for an amount similar to the adjusted price of the comparable properties. The sales comparison approach is preferable to determine the value opinion of the subject property when, there are sufficient recent and reliable market data on properties that are similar to the subject. Under this approaches these are also other more methods such as; Area methods, Assessed value method and Income capitalization methods (Appraisal Institution, 2020). Property interests are generally heterogeneous (characteristics). Even if the land and buildings have identical physical characteristics to others been exchanged in the market, the location will be different. Notwithstanding these dissimilarities, the market approach is commonly applying for the valuation of real property interests (IVSC, 2017). Even though, the reliance of with a single approached could not advised that the primary approach for many property valuations, particularly; when-available comparable data the methods of valuation have preferable for estimating, market value is the sale comparison or market approach valuation (RICS B. , 2019). The market approach is the most widely used and accepted to determine value for various purposes, including mortgage valuation. However, results will depend on the talent of the Valuers to find reliable adjustment factors (Asres, 2020).

2.3.3 Cost approach

The cost approach is a set of procedures through which a value indication is derives for a property by estimating the current cost to construct a reproduction of or replacement for the existing structure plus any profit or incentive, deducting depreciation from the total cost and adding the estimated sit/land value. Under this approach, the property is valued as a function of what it would cost to buy the land and construct the buildings. The cost approaches include such as; Quantity survey method, Unit-in-Place method, Index Method and Incurred Depreciation (Ling D.C, 2005). In applying the cost approach, Valuers must follow; the guidance contained in IVS 105 Valuation Approaches and Methods. This approach generally applied to the valuation of real property interests through the depreciated replacement cost method. It may use as the primary approach when there is either no evidence of transaction prices for similar property or

no identifiable actual or notional income stream that would accrue to the owner of the relevant interest ((IVSC, 2017).

2.3.4 Income Capitalization Approach

It is clear that property owners who have income generating property anticipate that they will receive cash flows from the property in the form of income from rental operations and price appreciation. The value of the property in this approach is, therefore, a function of the income stream that expected to produce. In the income capitalization approach, an appraiser first estimates the periodic incomes obtained from the property in the future and then convert the income forecast into present value. The process of converting periodic income (by using either direct capitalization or yield capitalization method) into an indication of a present value has referred to as income capitalization. The principle of anticipation is fundamental to this approach. It is the primary theoretical base for income approach. The income capitalization approaches also use; direct capitalization and discount cash flow (Appraiser Institution, 2001). Various methods are used to indicate value under the general heading of the income approach, all of which share the common characteristic that the value is based upon an actual or estimated income that either is, or could be, generated by an owner of the interest. In the case of an investment property, that income could be in the form of rent; in an owner-occupied building, it could be an assumed rent based on what it would cost the owner to lease equivalent space (IVSC I. v., 2001)).

Each of these valuation approaches includes different, detailed methods of application. According to this, the goal in selecting valuation approaches and methods for an asset is to find the most appropriate method under the particular circumstances. No one method is suitable in every possible situation. Due to that, the selection process should consider at a minimum:

- The appropriate basis (es) of value and premise(s) of value, determined by the terms and purpose of the valuation assignment.
- The respective strengths & weaknesses of the possible valuation approaches and methods,
- The appropriateness of each method in view of the nature of the asset, and the approaches or methods used by participants in the relevant market,
- The availability of reliable information needed to apply the methods (ibid).

2.4 Local practice of property valuation

According to the study 2015 that performed by Ethiopian Minister of urban development and housing report for modernized property taxation system project office investigation of countrywide investigation results with international organizations like the WB & UN one of the basis for the labeling of countries as “developing or developed” is the level and quality of infrastructures and services. Therefore, the question is not being Ethiopia label as a developing country but how can we join the other groups- the developed (MUDC, 2019).

As stated above many factors have been dilemma to this poor provision of infrastructures and services in the urban Ethiopia thus addressing the following key challenges could improve the situation: Lack of efficient urban land management system and Weak institutional capacity. It is clear that the selection of the valuation method depends on the situation in the city of Mekelle. The relevant primary and secondary data will be analyzed so to draw a conclusion as to which method will be appropriate.

Currently, there is no property tax at all in the city of Mekelle, but property valuation facilitated through collection of sales tax commonly known as “Assura” 5% and stamp 2% with total 7% services basis for determining the capital gain tax. Then, the property valuation is done by the municipality and other financial institutions including banks overall, all of them carryout valuation based on the traditional approach which is based on bill of quantities (conventional quantity surveying) though they have slit difference in terms of unit rates (MUDC, 2019).

Financial have property valuation ambiguity in terms of over and under value estimation thus led to dissatisfaction of both part the owner and customers. The root causes for service failure were the application of inconsistent property valuation and not managing the flexible market condition. The study result shows the banks applied the Ethiopian Financial Institutions (banks) Manuals. Similarly, all banks applies the cost approach for all-purpose of valuation assignment. The bank Valuers has limited power and professional freedom to exercise the valuation by authorized bodies for the sake of competitiveness of similar institutions. Due to this Market condition, construction materials types and the availability of basic utility are the main factors affecting real property valuation (Ejeta, 2020).

2.5 Empirical of studies

In this period, the application of the three valuation approaches namely sale comparison, cost and income approaches based value appraisal have categorized under the traditional methods of property valuation. According to different researches, studies reviewed on the various advanced property valuation methods have adopted in order to address the drawbacks of the traditional methods and to progress the advance the complicated and continuous nature of property administration. The system of property valuation has conducting under many advanced and energetics implementation model and application tools using a lot of integrated techniques and methods. Therefore, the recent development using the following advance methods of the property valuation system such as Artificial neural-networking (ANN), Hedonic pricing model (HPM), Spatial analysis, Fuzzy logic and Autoregressive integrated moving average (ARIMA) have been categorized as advanced methods of property valuation (Rotimi Boluwatfie, 2017). Even though, the world has been rapidly urbanizing, before many years and then modernized property valuation system has commenced, many of us still using basic property valuation yet which considering as a traditional approaches like sale comparison, income capitalization and cost approaches.

The selection of the valuation approaches and methods most find under appropriate basis of value and premises determine by terms and purpose of valuation assignment, reasonable possibility of the approaches and methods, appropriateness to the nature of asset and the method participants used in relevant market and availability of reliable enough data to apply the methods (IVS, 2020). The responsibility of selecting an appropriate valuation methods and approaches is for Valuers (IVSC, 2017), the banks have been using traditional valuation under manual system oriented then valuation guideline have influence over the Valuers perception and practice the value basis (Asres, 2020). However, the International Professional valuation Standards (PVS) not advised to reliance on one methods applying of the valuation of development property rather it has checks where possible using other methods of valuation should be an iterative process (RICS B. , 2019).

Anyway, the sales comparison approaches, inflicted that comparing it to similar properties that have recently sold and exiting real market through the compulsory adjustment made to drive value that recommends for residential properties and other available type of real estate with

reliable comparable sales (IAAO, 2021). The actual amount the investor receives under the rate of regular payable basis of idealized calculation of taxation seen (Antony Seely, 2001), the net-of-tax return is important. The approach used the conventional method of property valuation the income treated from the investment or corporation tax purpose it sources (David Isaac, 2002).

The income approach preferred for appraising property based on the income generates or expected to generate for commercial real estate and rental properties, which is primary concern of investors and investment (Fannon T., 2019). Therefore, all the financial organizations mainly for banks as business oriented financial institution the income (capitalization) approaches was the most recommended.

The cost approach mostly recommended for schools and churches when there are few comparable sales due limited market data (Appraisal Institution, 2020) and the reliance of the application of single valuation approach has not advice because it requires different consideration depends on the situation of property, purpose of valuation, and data availabilities (RICS B. , 2019). For example, for new constructed building, income generated, building age, high land value, present market and other intellectual properties should not assign a single valuation approach (IVS, 2020). The cost approach particularly recommended that for the newly built or under construction building and special valuation circumstances. For the special case, if comparable sale data may not available (Henley Wood, 2015).

The property valuation procedural gap caused for customers complains about the value of the properties that valued by banks (Amare, 2021). Same case, to reduce the fluctuation value financial institutions entails both over and under estimation issues occurred for banks advantage for risk security. However, owners and customers faced to dissatisfaction, inconsistency in property valuation and unbalancing with the current market condition (Ejeta, 2020). The study had done about banks Valuers shows that experts have limited power and professional freedom to exercise the valuation by authorized bodies to won partnership and institutional competitiveness (Teshome, 2020). Particularly, Private Banks would not use depreciation value of the real property due to the interference of management for the bank advantage, and there would be competition between each other to lend their money and treat their customers (Ejeta, 2020). The main purpose of the valuation done in banks not to estimate the property value rather made to ensure return the loan by borrows back to securing possibility the bank from risk (Asres, 2020).

Example, The land and related property should be register in structured server and suitable database system through cadastral surveying, property resignation and certification and investigation through detail physical, fiscal and legal information of the property (MUDC E. , 2005). In most case qualification to conducted property valuation under the proclamation 137/2007 under article 2(3 (13(1) (Proc., 2007), Ethiopia there has no standard valuation framework, regulatory institutions and professional valuation firms (Belachew, 2020).

Generally, The existed practice of the property valuation have done with autosuggested observation dominated application of valuation method; whereas the standard required a Valuers studied different method of valuation and who gets valuation accords with market evidence under the science and practical experiences (David, 2002). Selecting appropriate valuation approach is responsibility of Valuers under well-stated report of valuation approaches (RICS B. , 2019). Even at the present Legislation have been updating with limited improvement that the EFDR proclamation 4/2005 the professional requirement for Asset property valuation consultants should professional Civil Engineering or related, Professional mechanical engineer, professional quantity surveyor, Graduate engineer and accounts (IFRS certified) or three years working experience (proc. 4/2005). Banks in Ethiopia used similar procedures of mortgage valuation where they adopt the working manual from the most experienced banks (Asres, 2020). Other property valuation study said the Banks Property Valuers in Ethiopian are Civil Engineers (Belachew, 2020).

According to Ethiopian tax administration proclamation 410/2017 and Federal income tax 407/2017 regulations, the business and rental tax calculated using income per year multiplied by deduction percentage the tax rate without the stipulated difference rate (2017). On the other way, EFDR proclamation defines property valuation for compensation shows another deficiency. Land or its financial substitution of replaced or developed land to expropriated property owner for compulsory acquisition stipulated public service. It should calculate that correctly proportional considered the market value. Not only this has the expropriation had full of different socio-economic, cultural, region and neighborhood community disrupting. Moreover, the compensation legal framework has limitation over the method technique used and equitability of appraising fair value (FRDE, 2016). Still the practice in Ethiopia have not defiantly applied through the regular property valuation practices toward the right purpose of valuation assignment and professional Valuers, property valuation practice (Asres, 2020).

The legal framework of the country set under the proc. 35/2007 for compensation value said, “Compensation for Buildings formula made the amount of compensation for a building shall be determined on the basis of the current cost per square meter or unit for constructing a comparable building”. Which has not sufficiently defines the attribute property for real value appraisal. The authorized building administrator can assign the sell assessment for building property tasks for third party for legally licensed external expert under the stipulated contractual agreement. (Regional Standardization and Regulation, 2003). Beyond that, there is not any detail about the hugest requirement to facilitate effective valuation system. The standard for practice of the modern land and related property administration system would support by institutional frameworks, academic institution, training professional and relevant technological inputs that helps to improve the whole land and related property system (MUDC E. , 2005).

There have been trials for practicing the modern land and related property administration system would support by institutional frameworks, academic institution, training professional and relevant technological inputs that helps to improve the whole land and related property system (MUDC E. , 2005). In addition, the building administrator authority can assign the transaction assessment task under the contractual agreement for legally license external experts. Detail content of building directives, regional building regulation, may be defined building directive no. 5/2003 (Regional Standardization and Regulation, 2003).

Even though, brokers have play big role in property transaction brokers that the actual transaction of the real property does not indicated the market value, it very high due to the brokers intervention. Brokers been playing significant role for skyrocket actual price of sale price property (Asres, 2020). The proclamation under Article 7(4) states compensation for permanent improvement to land shall be equal to the value of capital and labor expended on the land (Tsala, 2022). This study has confirmed this basic finding result as part essential investigation. The property valuation should practice based on the entire valuation assignment measurement requirement, methods and evidences carried out under the national and internationals valuation standard stated professional knowledgeable, skilled and experienced Valuers under the strict supervision of a qualified Valuers (Asres, 2020). The modern required digital property information to provide comprehensive and accessible property data useful for all valuation purposes land use classification (Center for Spatial Studies, 2018).

The land and land related valuation of existing land value have not well defined value and development trend based allocation that makes the system unfair, caused to missed the multiple requirements affect a land property value. As a result, most land grouped under highest land value without not reasonable categories of the land grading regardless of the measurement of the coefficients value. Consequently, the high development intensive area of land laid under high tax and the owner who are not in development leave under low tax. By default, it discouraging investment (Alemu, 2024)

The property valuation in banks the valuation approach and market value that the banks used as a basis for appraisal assignment have not clear and acceptable this case to complain the customers. In addition, they used the only cost approach with the under value of estimated result of property exited market value and comparable sale property to secure that bank benefits (Amare, 2021). The land and land related valuation of existing land value have not well defined value and development trend based allocation that makes the system unfair, caused to missed the multiple requirements affect a land property value. As a result, most land grouped under highest land value without not reasonable categories of the land grading regardless of the measurement of the coefficients value. Consequently, the high development intensive area of land laid under high tax and the owner who are not in development leave under low tax by default, it discouraging investment (Alemu, 2024). The standard for practice of the modern land and related property administration system would support by institutional frameworks, academic institution, training professional and relevant technological inputs that helps to improve the whole land and related property system (MUDC E. , 2005).

The GIS aids to improve the transparency and genuine analysis of the spatial factors of appraise property. The synthesized sources show the possible themes of the GIS in property valuation process have significant role in order wise like data visualization, mass valuation, could base system and predication of future price. Overall, the mandate of the property determination has for the valuation practitioners in Malaysia. The practitioners includes Board of Valuers, Appraisers, Estate Agents and Property Managers, only registered Valuers (Sara, 2024).

The valuation model was developing using Multiple Regression Analysis Model (MRAM) in SPSS software and other statistical analyses of data have done to achieve the research objectives. MRAM measures the relative influence of independent variables on a dependent variable. The HPM, which is the valuation model that measures the influencing effects of particular

characteristics of a property on overall transaction price, while regression analysis is used to determine correlation of each characteristic to the transaction value. Regression analysis is a statistical technique used to determine correlation between different data points (Monson m., 2009).

According to the (Gopal M, 2011) study done in India indication; the Additive Multiple Regression Model (AMRA) has been developed and used in his study. The objective of AMRM, as applied to mass appraisal, is to model the relationship between property characteristics (independent variables) to property value (dependent variable). Finally, the dependent variable can estimate from the independent variable aimed the modeling to explain a lot with little. From the basic model types, the researcher use variables that were supposed to influence value in the study area. The standard MRAM approach extended to accommodate, for example, spatial dependency type models. Alternative methods have been employed in attempting to address the issue of spatial (geographic proximity) reflected in the dependence of the error terms, namely spatial autocorrelation (Bourassa, 2007). The application of spatial statistics has made significant contributions in modeling residential property prices (Osland L., 2010). It can also rank the characteristics of the property in order of importance using the Hedonic Pricing Model; it can help a Valuers predict the values of subsequent property as long as the attributes defined, large amount of data is required in application of HPM. The study therefore recommends that a centralized data bank created capturing sales data and property characteristics (Stephen W. Gatheru, 2015).

A limitation of HPM is that to obtain accurate and robust estimates large datasets with very detailed information about property characteristics and the surrounding environment needed. Omitting key determinants of property prices that correlated with availability of natural amenities may result in biased estimates and the results are sensitive to model specification, therefore care needed when building the models (Hamish A. , 2018). To make fill the gap on the accurateness and robust estimation of large dataset uses GIS with very detail information of property features. This is helpful to validate this research with relative to the reality in the ground and comparing with the existed studies.

The important insight into trend of the HPM based property price appraisal guiding as crucial concern in this field. Even the limited online resource engine have existed, despite of that the

adoption and explicitly criteria for browsing and selection notable progress as a valid replicable and interference ground of the findings. The result of the study done in Nigeria implies that the HPM based real estate market analysis not well familiarized (Rotimi Boluwatfie, 2017). The analysis of the statistical regularities and more specific relationship between the price and features of the property, used to make a model based on this possible to estimate the price of the given property (Belniak, 2017). In addition, it has benefiting transactions and creating a more transparent and equitable real estate markets (Copilot, 2024).

2.6 Case studies

This case study part of the literature conducted according to the real practice of the reviewed of these two basis application of property valuation from who has international and local experiences special valuation (Desta Gebregiorgis, 2023) and (Getchew Tadesse, 2023) MHSC valuation expert interviewed.

2.6.1 Case study – A: Global experience of property valuation

The property valuation often faces challenges leading to client dissatisfaction. In recent history of Indian government implemented a system to address these issues by recording property values as stated by owners for tax registration. This data used in banks, government offices, and by the owners themselves.

First of all the Indian Government as provide the opportunity of the defining the value of the property then

1. Expropriation Compensation: Owners compensated based on the value they declared for tax purposes.
2. Property Sales Registration: Properties intended for sale have to register with government offices, ensuring the transactions based on the tax-declared value.

This led the valuation system to become to accurate valuation of the community began to appraise properties accurately; Professional valuation system shifted to a system based on skilled experts and economic benefits to improved understanding of national wealth, proper use of property values for community and state benefit, and reduced administrative issues.

The advantages' of the systematic mechanism to produce the following outcomes

- ✓ Revenue Enhancement: Increased tax and related revenues.

- ✓ Policy Tool: Helped stabilize house rents, tax payments, land fees, lease rates, & utility fees.
- ✓ Market Stability: Enhanced accessibility, market economy growth, controlled inflation/deflation, and regulated market stocks.

This systematic approach provided accurate, fair property valuations and improved national economic management.

2.6.2 Case study -B: Value overlooked appraisal practice

As an Expert Insights experienced based discussion made about the property valuation practice done once a day. Valuation experts highlight that property values significantly influenced by factors such as location, cultural and religious significance, and the purpose of valuation.

Example from Addis Ababa (as seen in *Figure 2.3* below):

- ✓ Two similar land parcels (250 sq.m) in Addis Ababa, Mercato, Lidata sub-city:
 - Parcel 1: G+5story building, sold for 8 million.
 - Parcel 2: Old row house (almost vacant land), sold for 13 million.
- ✓ The higher value of the old row house was due to the buyer's forecast of long-term locational value and future investment potential, despite its poor current condition.

Current the valuation system issues:

- The system mainly uses cost approaches for residential rent and holding fees, which are not always relevant.
- Key challenges include the lack of a comprehensive database, neglected market system, limited expert capacity, insufficient government commitment, low community awareness.

The recommendations for Improvement:

- ✓ Establish a strong property administration system with substantial government mandates.
- ✓ Increase public awareness and provide clear guidelines.
- ✓ Improve professional competence through training and experience sharing.
- ✓ Leverage technology (e.g., software tools, accurate measurement instruments, cadastral and registration systems).
- ✓ Develop a robust database and train skilled experts to ensure a reliable and sustainable property valuation system.

This summary emphasizes the need for a comprehensive overhaul of the property valuation system to ensure accurate, fair valuations and to support economic development (Desta Gebregiorgis, 2023).



Figure 2. 3: Inverse value Multi-story and row house sale price comparison

Image source: Google map image 2010, captured 2024

2.6.3 Case Study- C: Similar building with extreme price difference

Two similar buildings in the same location have vastly different prices due to a misunderstanding of valuation systems, procedures, and an outdated urban system. The primary cause for the price discrepancy is an asphalt road dividing the buildings into different sub-cities.

The location and Administrative Influence both building properties

- ✓ Building A: 1000 m², valued at 50 million Birr.
- ✓ Building B: 500 m², valued at 5 million Birr.

- ✓ Despite their proximity (21-27 meters apart), the different administrative zones resulted in millions of Birr difference in appraised values.

Key findings based on the two building property comparisons the area of Building A has twice the area of Building B, but its value is ten times higher, indicating a significant appraisal disparity. Then real value analysis of the equivalent 500 m² areas, Building A's value is five times that of Building B. However, the market influence over the high price for the older building in a prime location might be reflects future investment potential rather than current condition. The real variations of the two building induced due to inconsideration of location value, limitation of professional capacity and drawback of the entire working system

Challenges in Current Valuation System:

- Indelicate Practices: Traditional valuation methods benefit from tax evasion, leading to inaccurate property values.
- Lack of Institutional Framework: Insufficient public awareness, absence of a comprehensive database, and poor technological application are major obstacles.

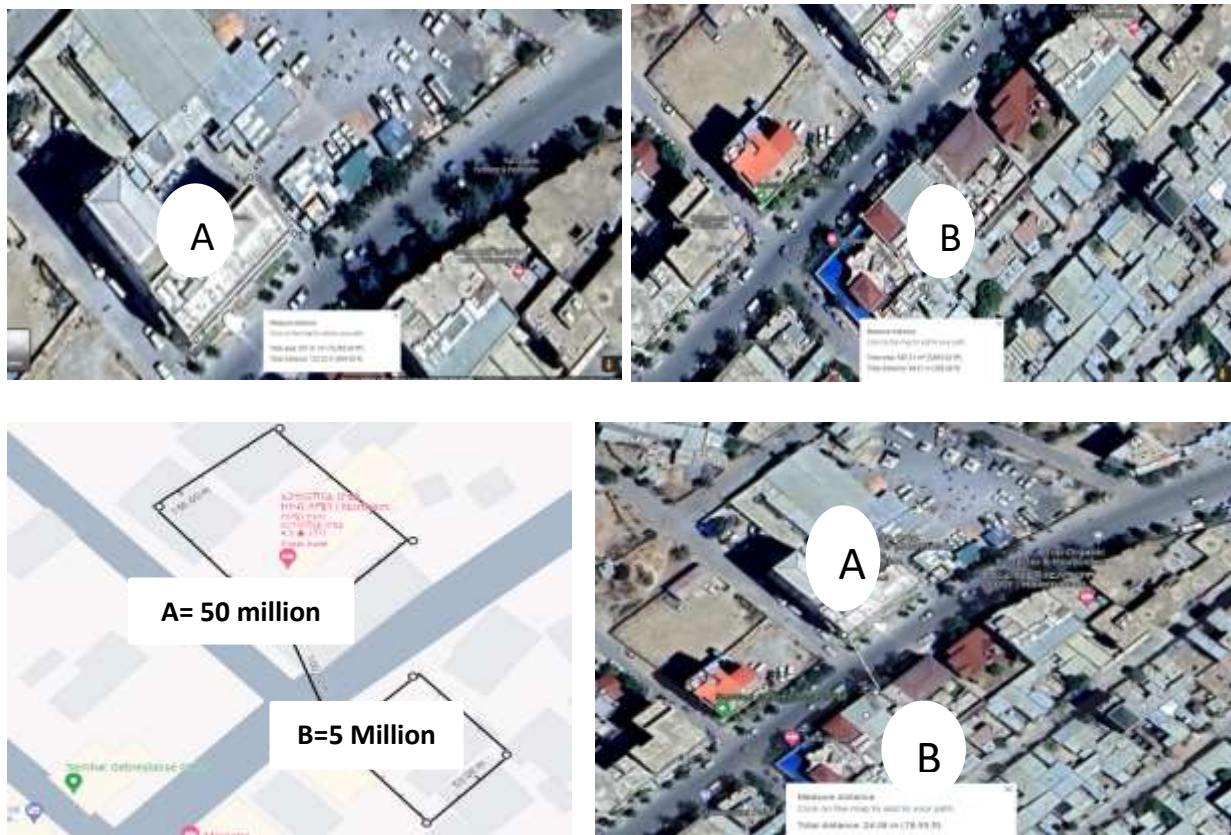


Figure2. 4: Consequence of poor and traditional valuation practice over fair value

Generally, the average size of building A = 1000 m² and B = 500 m² of the plot area. The real value analysis of both buildings looks like below in *Table2. 1*.

Table2. 1 *Sale price of equivalent property comparison*

No.	Building name	Size	Appraisal value	Expected relation	Real relation
1	A	1,000 m ²	50,000,000 Birr	A=2B	A=5B
2	B	500 m ²	5,000,000 Birr	1/2A=B	1/2A=5B

Source of case study: (Key Informant, 2023)

Figure2. 4, the building A has twice of building B in area but the appraisal value of A was 10 times. Based on price/area ratio, it became A=1000 m² and B = 500 m². Even if it compared with the equivalent ½ of A = 500 m² and the whole B = 500 m². The price value of half area building A (Area of 1/2A= 500 m², Sale price=25 Million) was sold 5 time building B (Area B = 500 m², Sale price 5 Million).

Generally, to sum up the roots of the case studies; the property valuation with tradition system was possibly practiced to with indelicate manner to make benefit both part from tax evasion. Therefore, the Indian government took the action to handle the challenge what happening here in Tigray and to register the exact sale price formally and voluntary before any transaction made then they would goes accordingly. The driving forces system for lacking of the institutional framework, low public awareness, absence of database and property registration and poor technological applicability.

The Indian Government's approach: the implemented a system to formally registered property sale prices before transactions to ensure accurate valuations. The aim was to address the property valuation constrained such as inconsistencies and enhance economic stability. Because the implication of the case study highlights the need for a robust system of property, valuation to ensure fair and accurate appraisal value practice.

2.7 Earlier studies gap identification

According to the review of global trend, indicate that, the knowledge and experience of the researcher have limited capacity of spatial data administration technologies (e.g. GIS) to solve the problem requires geographic data representation and location based property delamination. GIS have vital role to store, manage, analyze, manipulate and display of spatial and non-spatial

data. GIS includes integrated own database management system (DBMS) supportive interface for management of data input for property value store, retrieve, manage, analyze of spatial and attribute data representation. The study applies GIS and statistics technologies to produce incorporated result of spatial feature and attribute data to identified property in detail.

The same to in the property valuation for developed land of IVS in UK considered only for new development, any existed or redeveloped and other closed variable has value are excluded on that used the sale comparison and cost approaches or/and combination of both, i.e. residual method of valuation. The summary of the review shows the problem of appropriate selection of property valuation approaches, inconsistency of method and lack of scope inclusiveness. In contrast, this study essentially elaborates the issue of value equity and equivalence for similar property, factors affect property value and last adopt property valuation standard for built-up areas using sale comparison approaches for existed house and cost approaches newly built and progress sites.

Generally, these review have big role to gone the property valuation forward, however in this study that intended to fill more or less based on studies done concerning to the property valuation for many approaches, methods of analysis and implementation models of the assessment property value. However, these all shown us, the integrated knowledge gab, choice of inappropriate valuation method and model incompatibility to the intended property valuation. On the other hand, this study the will use the integrated application of GIS and HPM with the helps MRAM statistical analysis that leads to integrated solution of the better property valuation practices.

Based on the review in this literature; in global, continental and local level the studies done for taxation and few has for compensation purposes, however not facilitate with appropriate method and analysis tools, incomplete and inaccurate data access. Previous studies have gone advanced that could not related with our ground valuation practice and stage of technological advancement. Even though research has done through similar approaches however, the attribute used as property characteristic of the other advanced research are unlike to this research nature and magnitude over the property valuation. The gab among shown that the focus point of the advanced research conducted yet were based on digital accessibility, home based service, zero ambiguity and defined value towards each individual and at every inch value in accurate

measured value. However, our practice going vice versa that going through mixed practices of customary system. Due to this reason, the attributes was the physically feature based rather than detail property contents. The recent study could not too much relevant for this research. The application GIS and HPM were also new to that extent in terms of the trend of existing valuation system development, location of the investigating property and time difference of last research as property required updated the system. The characteristic used in this research were in accordance like distance to city center, utility accessibility, Transport accessibility and soon which were costly in case of the developed trend. In addition, relevance of the last study is not suitable to our current land administration system. Because, as absence of registered and digital system of property administration and cadastral system help to updated and manipulate continuous information as well.

In addition, the challenges in our country were overcome the developed nations before advanced the system emerged. Because, the level practice made long period they done; should be cope up with this level. Previously in Ethiopia, many researches have done to reduce the problem of the property valuation. Even through, still have many limitations therein that the property valuation have practicing traditionally and different techniques everywhere in governmental and non-governmental institutions including in banks (Ejeta, 2020) and (Amare, 2021), land valuation systems (Alemu, 2024) and other property appraisal exercised sectors. Therefore, it got crucial to conduct this with according to the local context. This study nobility has the focus of the study would not conducted the study with this topic. Some of the study indicates advancing property valuation but still has limitations of spatial, non-spatial relation and analysis methods; once using GIS prone to attribute data analysis; another time using HPM case in geographic data integration. This study uses integrated approaches to solve the problem in the study area and reviewing the collective output of the other studies not filled yet. This study has vital role to solve the existed problem of the property valuation in the particular study area, which is crucial for practicing the modern methods of property management. The property values the total executed price value with existed market condition and detail description of the property. These examine the crucial characteristic by modeling for thus caused for high property value variation in similar property.

Chapter-Three

3. Research Methodology

3.1 Description of study area

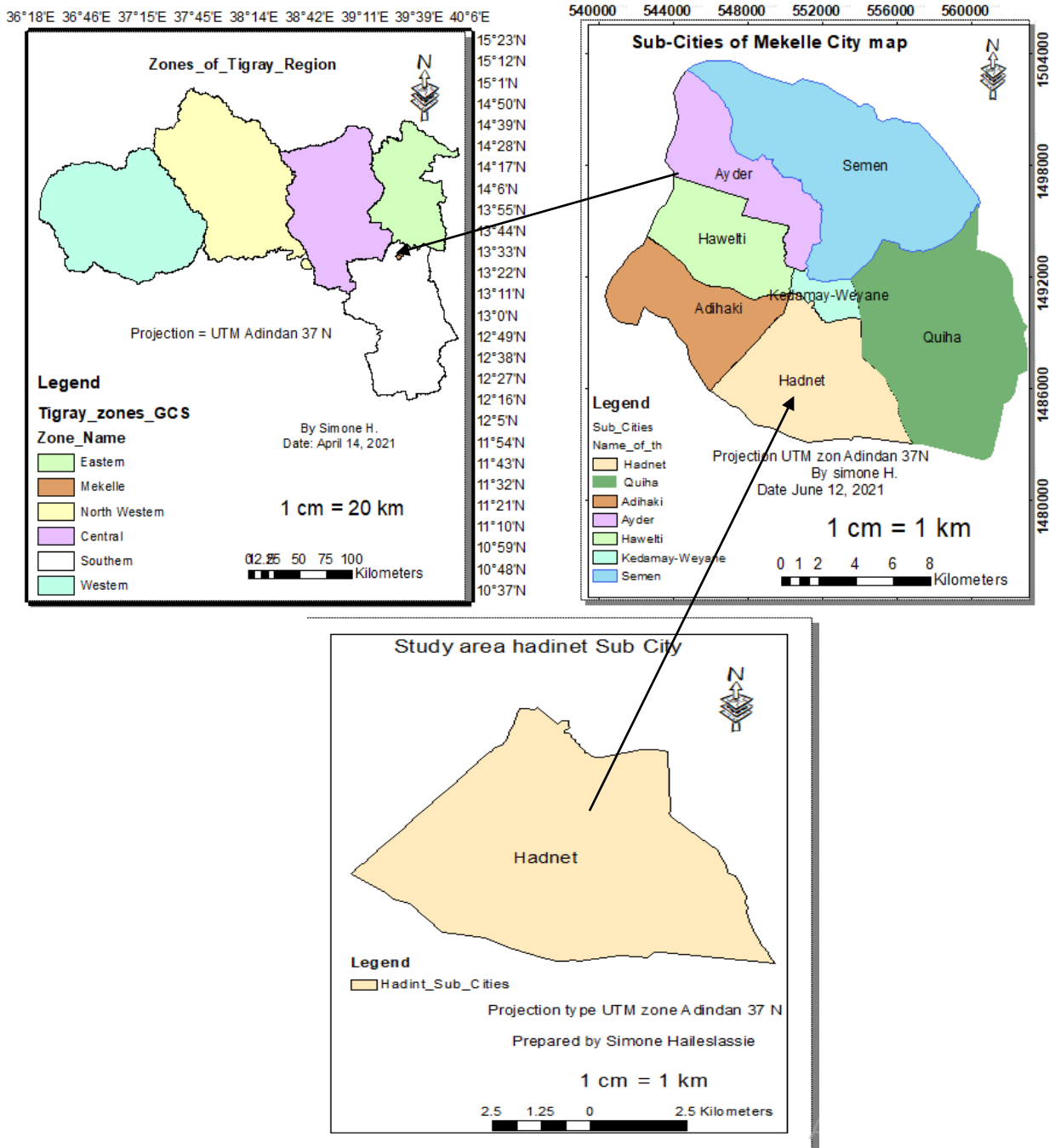


Figure3. 1: Map of study area (Mekelle city administration and Hadinet Sub city)

Source: (Author 2021)

3.1.1 Topography

Mekelle city is found at the foot of Choma and Bubu Hills that form a triple watershed dividing between the Tekeze and Danakil. The climatic condition is often characterized by being windy. Nevertheless, it is not that much pressure for health situations. The altitude ranges between 2000 and 2257 meters above sea level.

Mekelle City has seven local administrations or Sub Cities namely; Hawelti, Adi-Haki, Kedamay Weyane, Hadnet, Ayder, Semien and Quiha. Within each local administration, there are boroughs. The sub-cities of Mekelle comprise the area formerly incorporated as Mekelle City. While falling under the jurisdiction of Mekelle Special Zone Government, each sub-city is also a borough with its own administrator, like other cities of Ethiopia (Adonay, 2011).

3.1.2 Demography

Mekelle City is the capital city of Tigray Regional State and the third most populous city in Ethiopia. According to one project group conducted study by Ethiopian Minister of Urban development and construction about property valuation for modern taxation purpose data. The total population of Mekelle city in 2018 was 269,598. This number has projected for last 2020 to be 307,444 total populations (MUDC, 2019). According to Municipality data of HSC of population projection for 2023 indication that expected to reach 155,086 (Municipality, 2023).

3.1.3 Climate

Relatively climate condition of the study area has high temperatures year-round and distinct wet and dry season. The climate is tropical savanna with the temperature-recorded minimum in December month 15 °C and maximum in May and June months 27°C on average. The cumulative monthly average temperature reaches above 18 °C (Weather-base, 2018). The minimum 10 mm recorded in January and December and maximum 220 mm recorded in August, the average total of rainfall recorded in one-year shows 720 mm (TSA, Tigray demographic , 2020).

3.1.4 Economic activities

Mekelle city is the third biggest city in Ethiopia. The main source for their day-life run the economic activities classified into many categories. From these wide/local area and multi-sector trading, transport delivery, consultancy offices, civil servant and some city farm facilitators etc.

It has been a boom in hotel services for tourism, and conferences due to predominant place, Mekelle holds in northern Ethiopia. The development of healthcare services has greatly aided in improving the quality of life of Mekelle inhabitants. It has also surrounded by agrarian villages that sell their crops to the urban population in the markets. Traditionally there is a market on Saturday and Monday where a wide variety of produce and livestock is available for sale, in addition to salt from Afar. Now, everywhere the town shops and streets are market places, because of various classes of communities' daily activity and officials' assistance to access houses for residential and work, it is extremely difficult to do so.

3.1.5 Land use patterns

Mekelle city is rapidly expanding urban area and use as a center of trade, industry, technology, various economic activities and public as well as private education of the region, Tigray. It has a number of financial institutions that include banks, insurance companies and micro-finance institutions that can give credit facilities to small business organizations and higher-level investment organizations. In terms of the overall growth and development of the city, Mekelle gradually opened its doors for modern civilization. Infrastructure development going improved from time to time. The major infrastructure development up to end of 2010 presented. In terms of infrastructure, the project sites not developed well compared to other part of the city. For example, there is no electricity besides to the absence of water supply and lack of proper road accesses (MCAEIA, 2020).

There is about 107.25 ha irrigated land with major crops including: onion, potato, tomato, white onion, green paper etc. and 1288 ha rain feed cultivated land use to grow the crops. There is one official cattle market in Mekelle city; however, goats and sheep sold at every corner of the city. The livestock market trend between 2009 and 2010; shows increase in cattle but decrease in goats and sheep (ibid).

The low-density built-up area increased across all zones since 1984 and 2014 E.C. High density values observed in central distinct that indicate compact urban growth. The percentage of low-density built-up area increased from 16% in 1984 to 21% in 2014. Increasing of the land consumption perceived consecutively over the three decades towards creation of denser urban growth patterns. It exaggerates scarcity of the land and other real property value up on the demands. It is dispersed growth of horizontal urban expansion with less vertical urban practice as

expense of agricultural land resources. It is curious issue that every respective professional and official body has to focus to balance the house demand and preserving the productive agricultural land to enhance residents' life as well as allow provision of public services equitably (Ayele Almaw, 2017)

3.2 Research design

This study designed to using descriptive type research that implemented to operate the respondents and existed data towards the study significance and nature of the study theme. This research type conducted using mixed research approaches. Because, the property value have combination of theoretical and conceptual insight of the properties describe the trend and practice. Similarly, Specify and resolve the attribute variable affecting the regular condition of the valuation system.

This study used cross-sectional survey research design to survey time variability and interrelated nature of property appraisal. It has done in multiple area and general focus points. To address that different data sources helpful to identify the building property characteristics existed in similar property and location of the study areas. The study used both probability and non-probability sampling technique to collect qualitative and quantitative data. These data used for this research conducted mixed research approaches with discrete and continues data type that analyze the gap between the existed valuation system, attributes and practices. Accordingly, these appropriately collected data would analyze in accordance suitable for the spatial and non-spatial puts data presentation and dissemination in to effect of this research study.

3.3 Sources of data

The data were collect from primary and secondary sources events as the relevance and evidence towards the appropriateness and compatibility of the data use as crucial input for the specific study assignment.

3.3.1 Primary data sources

The primary data source has collected through probability and non-probability sampling techniques. These help to gather primary data directly from the study area's selected respondents. Thus, residents involve in property transaction, Hadinet municipality, six selective banks, Mekelle city administration, selective property related regional agencies and property

brokers. These data collected through interviews, questionnaire, focused group discussion and field survey to find sufficient data. The relevant data about the existed valuation practice and challenges, factors affecting valuation and field data using the listed instruments from appropriate sample frame.

3.3.2 Secondary data sources

The secondary data source has collected from the existed property value documents of regional valuation standard and regulation, Mekelle city administration property valuation and construction design, municipality office, selective Banks, property brokers and Hadinet residents who involve in property transition (owners and possesses). The published articles, legislation, GIS, and property books, existed spatial and non-spatial data. The property value document includes the location, size, quality, use and holding types of the data to understand the nature of the property value. Different property appraisal literature and books reviewed to identify gap and to strength the study procedure for validation of its result too. The spatial data document have important role for facilitation of GIS application includes location data, topographic data, coordinate values, study area shape file, Vector and raster data are included. The non-spatial data includes the demographic, socio-economic and statistical census data and the pre-prepared existed map, graphic, published and unpublished literature, legislation, policy statements, and government documents categorized under the secondary.

3.4 Samples techniques and methods

3.4.1 Target population

The target populations of the study were the housing unit to gather the recent and accurate data to investigation the relevant evidences of the research study inputs. In other word, the considerable population's types are the total housing units. The target population of the study was 43,549 housing units. The data were collected from the study area specifically 'Hadinet' Residents Involve in Property Transaction (RIPT) or Owner and Possesses (OP) such as property owners and tenants/buyers Tigray/Regional Land, Related Agencies, and Investment Bureau (T/RLRAIB) including construction and trade and industry office, cadaster and land registration office, regulation and standard property valuation, and Tigray investment offices. Municipality of Mekelle city Administration (MMCA), Construction and Municipality 'Hadinet' Sub City (MHSC) includes valuation experts, planners, revenue officers and directors. Banks with

branches in the study area banks (Six selective Banks) such as CBE, Wegagin, Anbessa, Abssinya, Dashin and Hibret bank's valuation experts, banks credit officers and banks managers, and property brokers using based on the proposed data collection techniques.

3.4.2 Sample frame

The study has conducted in all areas that could help to get access of the property data. Mainly, Hadiet Residnets involve in property transaction (HRIPT) through questionnaires and FGD. This targeted population specified towards objective, study feasibility and purpose of the study. The appropriate respondents nominated using the municipality data records and property transaction facilitating residents in justice office. For professional and official using the staff role and directing best experience individuals in the offices. Therefore, based on the 'Hadinet' municipality documented data the housing units were 43,549. The housing units distributed to five 'Tabias' proportional based on the household per tabia data found from the municipality. The housing unites ratio per tabia of each five Tabia contains Tabia 'Metkel' = 6097 housing units, 'Aynalem' 4355 housing units, 'Werie' = 6532 housing units, 'Debrie' = 4790 housing units and 'Simret' = 21775 housing units were the distribution ratio of each 'Tabias'.

According to the municipality existed data total 43,549 housing units 6.9% of thus made property transaction (MHSC, 2023). Therefore, 6.9% of the Tabia Metkel's proportional ratio which shown 6097 housing units. The researcher purposely selected 'Tabia - Metkel' with 6097 total housing units. As a means of reducing the researchers' shortage and balancing resources, it was must to selected one of the five Tabias. Because, the time and budges constrain force to select one "Tabia". From the tabias, Tabia Metkle was preferable study site in terms problems and complex property nature, presence of property variables, the property value similarity and data access. The total targeted population of the study was 6097 in study area then equivalently 6.9% of these populations became 420 samples. This number means the simple frame of the study. To address the study for the property owner and possessor purposively selected on 'Tabia' that made property transaction.

3.4.3 Sampling techniques and sampling size

3.4.3.1 Sampling techniques

This study used probability and non- probability sampling technique to conduct the appropriately the study objectives.

The probability sampling used to collect data from the residents involved in property transaction by simple random sampling method. The simple random sampling method used for property owner and possessor to meet the plan study objectives.

The study used purposive sampling technique and simple sampling technique of non-probability sampling techniques. This helped to collect the appropriate and relevant data from purposely- For MHSC, MMCA Zone land deepened and management office, Hadinet Sub City municipal office, Hadinet CBE, Wegagin, Anbessa, Abssinya, Dashin and Hibret banks branches and all distinct banks, Regional office mentioned as RLRAIB and property brokers used structural and semi-structural interviews, and FGD. The case to select the sub city is the researcher expected to find the data accessibility, variability of data nature to be research and inclusiveness of existence property characteristics and city multiple land use.

The structural interview distributed for the Municipality of Hadinet, Bank experts, Mekelle city administration and regional agencies that nomination purposely based on their position and the research focus points. There were property Valuers, credit officers, managers and vice managers and for more strengthening through semi-structural interview and further discussion (focus group and panel discussions) conducted that reinforced the evidence concurrently.

3.4.3.2 Sample size

The sample size of the study selected based on the appropriateness of the property data sources and the nature of the data existence according, what, where and from who will the data collected. Then, these respondents selected in two ways; using simple random sampling technique for the property owner and possessors and purposely selected consider samples for valuation and attached experts, bank manager and property brokers to provide the properties data will be accurate and complete value.

The target populations of the study are total 6097 housing units. Similarly, using the percentage survey conducted by the municipality over transaction-executed property in the sub city the selected “Tabia Mekel” 420 house unites had made property transaction. This sample frame of the study frame then researcher took the 420 of the estimated transaction made number of building property the selected ‘Table - Metkel’. From the 420 the sample frames of the study. Therefore, as the populations have homogeneous nature, 25% of the total transaction made housing units selected by simple random sampling using n^{th} number of the first taken sample

proportionally. The first – four hundred twenty (1 -420) then accruing the 4th number of every 5 number taken respectively. Finally the 4th value of the list 1 - 420 at every 5 groups provides the sample size 105 which the actual respondents.

3.5 Methods of Data collection

The valuation techniques rely on the collection and analysis of data that incorporates of social, economic, planning and environmental attributes, and specific data including local market conditions, details of transactions such as location, physical and functional form and legal characteristics. Respondents will be select using the simple random sampling for property owner and possessors of the selected ‘Tabila’. Besides, using purposive sampling technique took from respective experts and property brokers. Therefore, to do that the following data collection instrument applied accordingly;

3.5.1 Questionnaire

The primary data collected using open ended and close-ended questionnaires from the property owner and possessors who made property transaction. For the owner and possessors 105 questionnaires have distributed to fill the chosen respondents in the selected ‘Tabia’. The pilot test questionnaires conducted using open-ended and closed-ended form for different selected site and respondents’ categories based on this the improved clear and addressable one prepared as the expense of pilot test. Finally, the questionnaires arranged in well-done manner and translated into local language, Tigrigna. According to the framed number and defined the possible area to meet place of individuals’ them the questionnaire distributed physically with well-oriented and trained assistances to collect the questions.

3.5.2 Interview

The interview schedule administered to a sample of key informative respondent for finding extra professional based data from the purposely-selected sectors. In this section of data collection, structural and semi-structural interviews have implemented to address the purposively selected respondents from 30 MHSC, 42 Six selected banks and their regional head offices, 16 TLRA, 7 MMCA and 9 Property Brokers. The 104 participants have interviewed in oral and written forms for the purposively selected sectors. These interviews have the aimed to collect insight points to excel evidences about the existing property valuation method, identifying the problematic factors affect the property value and trends of standardizing the property valuation procedure for similar

built-up property values of the study area. To do that semi-structural interview was interesting for the flexible and deep investigation of required property qualitative data. The structural interviews have done for the quantitative data as well.

3.5.3 Focus group discussion

This method of data collection conducted the researcher believed that to reinforce more detail information and clarity on specific points seems contradicting one to the other and with ground situation at focused group discussion with residents' respondents. Similarly, decisive panel discussion done with bank managers, office directors, valuation experts, property brokers and appointed individuals done focus group discussions. These discussions made for 17 times in different period. The discussions have including the group discussion and panel discussions. For example, six in banks, four in MHSC, and three in TLRAIB, two in MMCA and two times in POP have conducted successful discussions.

3.5.4 Field survey

This field survey included the site observation of the existed property nature, neighborhood and external perceptions and geographic feature, partial physical assessment on property similarity and observation has play great role in value estimation including the apparent factors influenced the property of the study area. The observation technique was categorically keen on building structures, duration and quality, building function, utility accessibility, exist comparability, location suitability for market attraction of the property. Direct observation has done alongside with photography.

The location of buildings defined by took HGPS, which rented from private consultancy offices and mobile GPS measurement. Then data form Ground survey and Remote Sensing Image (Satellite Imagery). The ground survey measurement was done using Mobile GPS to cross-check documented control point to the geo-referenced the satellite image, aerial photography used to produce map of the intended study area.

This led to accurately collected of ground control points for geo-referenced through overlay the satellite image and aerial geographic with right location the confound image of the specific area of study.

3.6 Data analysis and interpretation

3.6.1 Data analysis

The main content of the study deals on the property description, measurement and other pertain value of it. This means that, qualitative data contains method of property valuation, valuation system, measurements techniques and characteristics of the property value affecting factors. This emphasizes and applies though the application of GIS for identifying existing building property that we are going to about its value variation. To analysis concrete research concept, the GIS would apply to geo-referencing, identifying property location, value map production, and for categorized for similar property for the system of property valuation. Moreover, HPM used for define the characteristics of property by creating measurable attributes property valuation that have great role in practices to find appropriate market value of the built-up area properties. The quantitative data would be analyzed using statement narratives, result presentation and discussions of different tools and techniques.

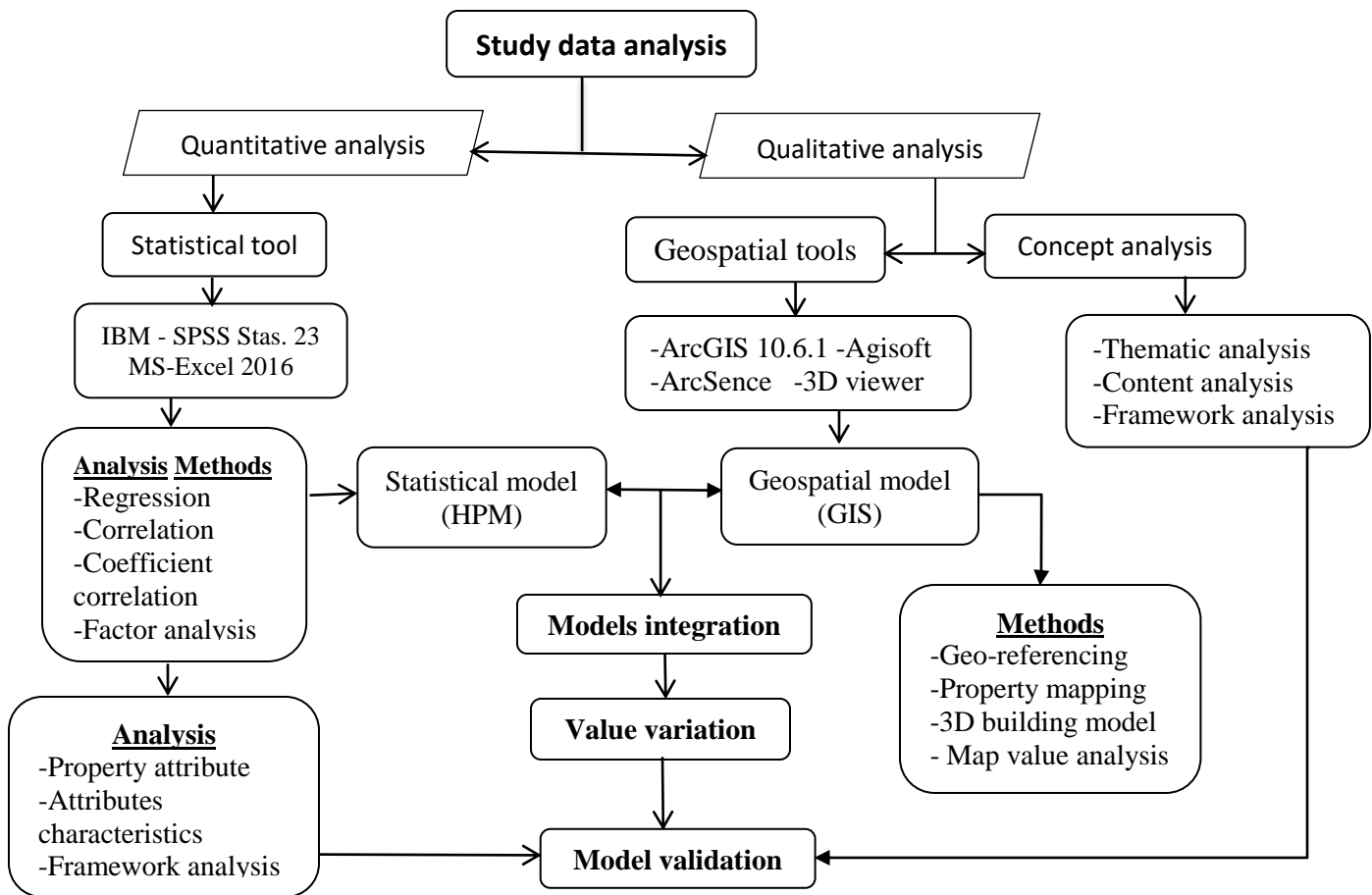


Figure3. 2: Data analysis diagram of the Study

The Hedonic Price Model means a hedonic pricing method places emphasis on the relationship between selling price and attributes for estimating values of properties analyzes using SPSS statistical tool which is the additive multiple regression analysis method. HPM used in Property Valuation because it has the ability to quantify scientifically the factors affecting Property values (these are social, economic, environmental and governmental forces).

The combined application of GIS, HPM and SPSS of statistical methods that suitably fits this study, through the advanced application of GIS tool and integrated system for property valuation on built-up areas, and the factors affect the property values. The geo-referencing, mapping, modeling and analyzing of different spatial data conducted using GIS and others suitable tools. Due to this, the data will be analyzing and interpret accordingly implementation of these technologies, models and techniques briefly discussed on the above.

Generally, the data analyze applied using appropriate valuation method and system with possible approaches. Mainly the qualitative data analyze through content analysis and GIS map format. On the other hand, the quantitative data were analyzed statistical analysis methods used for the quantitative part of the study. But, the discussion, geospatial tool, HPM model used as analysis methods of this study used for both qualitative and quantitative data.

3.6.2 Data Interpretation

The appropriate data gathered using the above methodologies to conduct tangible and effective research discussion and investigation of results. The HPM that has the useful model for defining and correlation of the computer-based locational property value and variable nature of the property data using GIS tool and MRAM statistical analysis methods. GIS application of property valuation to fix the factors affect it values through integrated implementation of spatial and non-spatial, analysis and SPSS this is statistical tool analyzed and interpreted the non-spatial data of the property values. These tools were great implication to manage and manipulate data properly and precisely. The collected and analyzed data have interpreted using different methods words discussion, maps, graphs, tables and diagrams accordingly.

3.7 Pilot results

The survey of data collection of this study pilot test held in the following area and number respondents selectively. To conducted this pilot test data collection, it dealt with Five Municipality of Hadinet sub-city (MHSC) municipality offices employers, Six different banks value one from each bank, four MMCA, Five from Tigray land and related regional agencies purposely selected, and Fifteen Community, Five justice office and Ten from property brokers have conducted. To collect data using random sampling for community and purposively sampling for all the others groups interview have applied. The pilot test was contains the general and core information about respondent voluntariness, understanding of property valuation, practice and their satisfaction in the property valuation system related service deliveries.

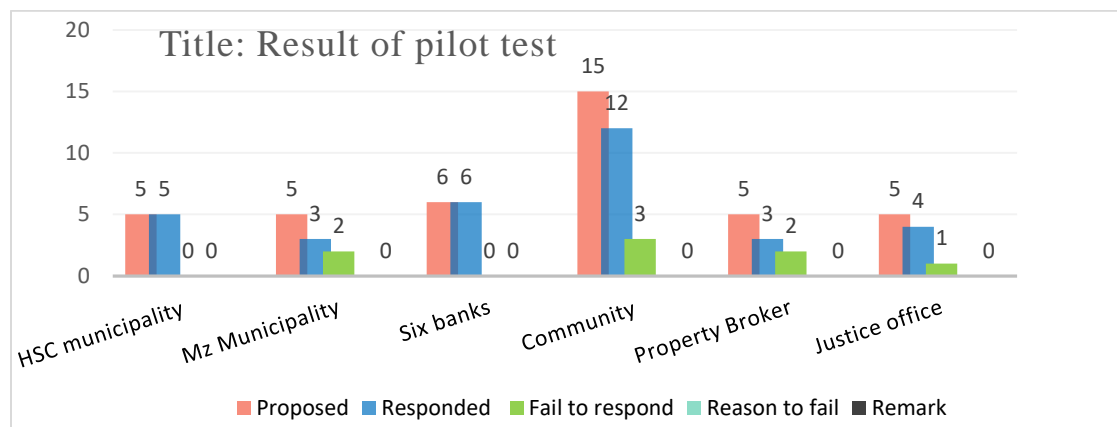


Figure3. 3: Pilot test result

Source: (Field survey, 2023)

3.7.1 Significance the pilot test

It has done as the expense of almost two weeks' time for applied this pilot test. At as result, it was very dedicated and learnable survey. Even, this pilot test has played many roles achieve this study in successful level that to define the main and relevant significant are the following.

- ✓ To improve the questionnaire content and clarity be understood for respondents.
- ✓ To adjust target population to maximize reliability and availability of data.
- ✓ To understand the environment about base to answer and feeling of respondents.
- ✓ To ensure respondents understanding about focus area of questionnaires.
- ✓ To eradicate any mistakes identified during survey.

- ✓ To adjust target population relevantly, data collection methods, and sampling techniques revised back with significant roles.
- ✓ To identify and set option for practical and technical problems around study site.
- ✓ It helps me to identify another way to find the real data about sold property.

To summary based on the empirical of the pilot test result, different improvement and arrangement have made toward the effect of the data collection techniques, sampling technique, survey number, and communication approaches. The data collection instrument was questionnaires and interview for all repentant accept property broker. In addition, I intended to use focused group discussion (FGD) for all groups. Overall improvements have vital role to accomplish the study in well effective manner.

Chapter Four

4. Result and Discussion

4.1 Study findings

4.1.1 Reponses rate of the study

As expense of the pilot test, this study has proposed to collect data from those target populations using questionnaire survey, interview and focused group (FGD) discussion. Because of this, the participation and feedback of the target group outcomes shows below in *Figure4. 1*.

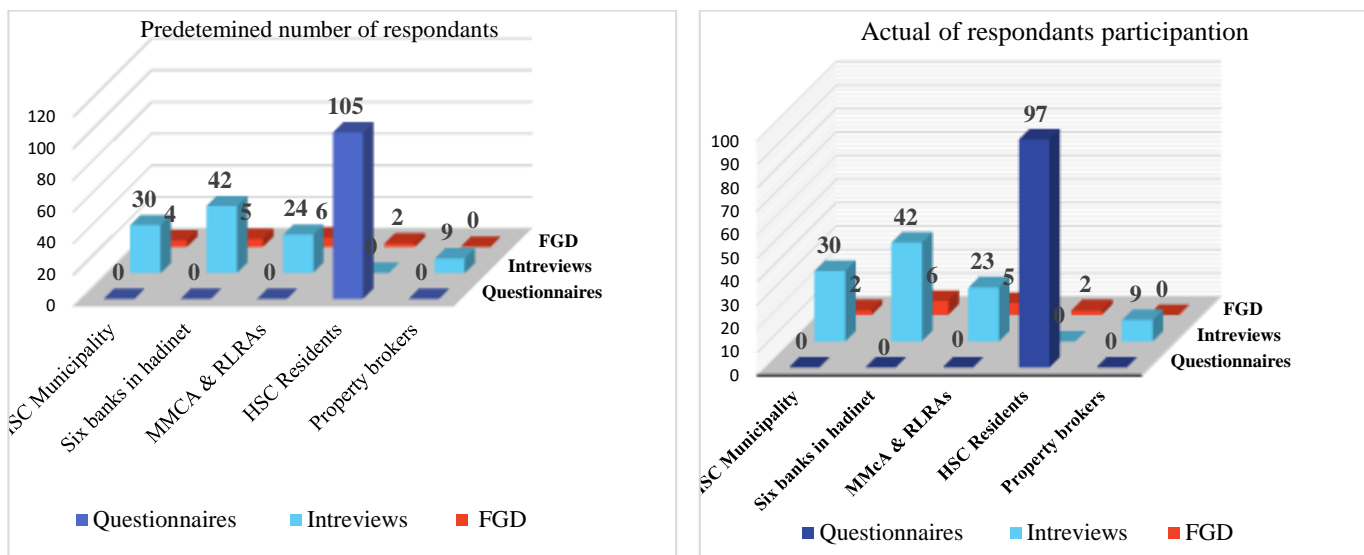


Figure4. 1: Summary result of respondents' survey

The contribution of the study survey suitable for the data collection instruments for questioner, interview and focused group discussion. The close-ended questionnaires survey was for Hadinet residents of Property Owners and Possessors (POP). The study has made in the following purposively selected sectors to collect valuable data where using structural and semi-structural interview for 104 respondents, and using 12 focused group discussion (FGD) in the written and oral forms. These selected sectors includes the 30 respondents Hadinet municipality, 42 from Six selective bank in Hadinet, 23 Municipality of Mekelle city and Regional Land and related Agencies and 9 from property brokers. These groups of population and data collection instruments decision making have supported by the questionnaire survey of pilot test look in *Figure3. 3* above which, played great significant role specially on identifying the right place for

purposely selecting the property valuation practicing sectors and individuals who were currently sufficient data, evidence and currently experiencing system.

This survey data about the property valuation's methods, practices, challenges and recommendations collected from these; (i). Municipality Hadinet Sub City (MHSC), (ii). Six Banks HSC branch and its distinct offices have the same content. (iii). Municipality of Mekelle City Administration (MMCA) (iv). Different regional agencies land related agencies and Investment Bureau of Tigray (LRAIB) has the main actors of this research. In addition, residents' focus group discussion and other panel discussion held different procedurally. Furthermore existing documents, proclamation, legislations, directives and working manuals of regional and national offices have explored for more study evidences successfully in the mentioned huge private and government office and institutions including the sub-office of them purposeful to the study.

4.2 Assessing the existing practice of property valuation

4.2.1 The property valuation practice overview

As introduction all respondents were given feedbacks those have awareness about property valuation. According to the residents' survey results below in *Table 4. 1* from 97 respondents participated in the survey study 98% awareness and the remaining 2% were No awareness and No (none) information on property valuation. This means that not about the detail practice of the field area practiced. This only indicates the valuation exercising regardless of the science, techniques and relevance of overhead. Similar, almost all sectors key informant from 97% of 32 informants in MHSC, 98% of 40 informants in Banks, 100% of 23 informants in MMCA & RLRAIB, 100% of 9 informants from Property Brokers have awareness the others percentage in each case have not awareness respectively for all four sectors survey. Even though, it has expected the feedback of the sectors to be well aware that the understanding level of all respondents would be not sufficient; unfortunate few of the key informant were not understanding over it. This shows, in most case the professional have appointed by general performance, related filed and by position. For instance, as this study confirmed in all sectors and previous study done for property valuation for mortgage value in banks intuitions shows not all property valuation experts were property valuation professionals rather Civil Engineering and related fields (Belachew, 2020). Because of this, they have being applying 60% % average of all

sectors in *Table 4. 1* below that the cost approaches done for all-purpose of property value appraisal. We have many organized and highly advance global experiences but the legal framework of property valuation in Ethiopian has not detail explanations such enough for all property valuation purposes.

Table 4. 1 : Respondents understanding about property valuation

Summary Table of Respondents Feedback						
A	Study assessment feedback of HSC Residents’ questionnaires survey (community)					
1	Do you have a knowhow about property valuation?					
	Yes	98%	No	1%	None information	1%
2	Have you ever made any building property related value appraisal?					
	Yes	82%	No	12%	None information	6%
B	Purposively selected sectors who expected to practice property (Sectors)					
	Key Informant feedback	MHSC	Six Banks	MMCA & RLRAIB	Brokers	
1	Having general knowhow about property valuation					
	Yes	97%	98%	100%	100%	
	No	3%	2%	0%	0%	
	No information	0%	0%	0%	0%	
2	Practicing of property valuation for building property in your office					
	Yes	80	93%	78%	33%	
	No	20	7%	13%	56%	
	No information	0%	0%	9%	11%	

Source: (Key informant, 2023) and (Survey, 2023)

For instance, as MUDHC (2014), Payment of Compensation for Property Situated under the regulations of Proc. No 455/2005 provide the methodology for Assessment of Compensation or replacement for buildings for expropriated Article 9 requires that the valuation of property carried out by a certified private or public institution Proc.135/2007 revised 2014.

The property valuation is integral part of daily activities of the society in the world. Because, the property appraisal value for different reasons to established exited value of property. However,

independently, individuals may not involve directly. The result in *Table 4. 1* above that the residents of the Hadinet sub-city who those involved in property transaction survey indicated that 82% RIPT, 12% not involved and 6% were not information on transaction. These respondents have selected because of they involving and/or was involve before, so that more than half of the respondents agreed the transaction took part. The other feedback shown us, 18% residents respondents no made transaction and no information about appraisal value of any property. Nevertheless, selected as key respondent was because the involved in property transaction from owner and processors. The further investigation made to agree with one of the results make that more inspection and discussions done. Accordingly, around 60% respondents those approved the property transaction situation was the processors. According to the cross sectional reinforcement of the study evidences through FGD indicted that the 40% of the transaction assured and 18% others of denied their property transaction was almost 98% property owners. Even reasons were different, whereas the main causes were not make public their sale information due many personal and legal cases some of the bold case them missed they years of sold and the real sale price have not officially registered as it is.

Similarly, the role of different sectors applying property valuation in their offices shown as 80% of the 30 key informants from MHSC interviewees. The 93% of the 42 key informants from Banks, 78%, of the 23 key informants from MMCA & RLRAIB with 9% have none information and 33% of the 9 key informants property valuation, 56% not practiced and 11% have none information. That about 67 % property brokers have weather they are not practicing or none respectively, for more detail looks the above *Table 4. 1*. Some the RLRA of the regional experts have not applying property valuation for customer service in their office rather than for standardization and regulatory framework preparation. Some of the experts and few high officials in sectors have not well informed about the valuation practice; because not few number of such key informant in sub-city municipality and banks sometimes also called “property evaluation” which is not expected from authorized experts in the progressive era of property administration. Actually, overall the results of the society and sectors have engaged of property valuation incur connected services.

4.2.2 Methods and Practices of Property Valuation

The transaction involved Owners and Possessors actively participate in this study survey in *Table 4. 2* below about the building type made value shows 52 % villas house, 27% traditional /old design house, 12% was G +2 buildings, 4% normal/ raw house and 5% others. The categories of the building standard are familiar in most case but the 5% categorized in other section represented those informal settlement houses materially or measurements unstandardized constructed for the sake of selling, compensation, or other means of transaction. These variety house standards of building property were appraise for different purpose. The residents as client were appraised property 61% for taxation, 12% for compensation, 12% for sale, 9% for rent, and 6% for collateral purposes. The further discussion conducted from selective respondents for detailing the purpose of valuation and its results. The taxation and compensation have the common valuation were applied in as service. Specially the taxation have took the major as means of government revenue collection and anytime and in different service therein tax purpose however it only using current market study based for taxation value. The same, area calculation and exiting market study based for compensation. Additionally, the property valuation in sale and rent has requested revenue collection-oriented practice not to balance and legalize the means of transaction. The system of the valuation used were cost approach for all-purpose which was insufficiently enough.

Based on the Ethiopian tax administration proc. 410/2017 and Federal income tax 407/2017 regulations; the business and rental tax calculated using income per year multiplied by deduction percentage the tax rate. Without the stipulated difference rate, it used same means of calculation for both different kind of income generation nature. It needs deep analysis of level of investment, assumed daily, monthly and monthly income in whatever means, access of supply (imported or exported) and soon under specific contexts.

On the other way, property valuation for compensation shows another deficiency. It is land or financial substitution of replaced or structured land for the expropriated property owner for compulsory acquisition stipulated public service. It should calculate that correctly proportional considered the market value. According to proc. 979/2016 recongdged not only this, the expropriation had full of different socio-economic, cultural, region and neighborhood community

disrupting. Moreover, the compensation legal framework has limitation over the method technique used and equitability of appraising fair value.

The period of property valuation for collateral have different cause may be for loan, mortgage and collateral of other means of exchange that led to two phases of implementation. The agreement phase and the payment phase. First, the payment phase expected that continuous despite compound and interest rate (if) until the completed the amount based on the signed contractual agreement. Second, if the customer could not return the back payment based on the signed contractual agreement, the second party has possibly to proceed to foreclosure. The residents FGD argument over the foreclosure showed that with unfair, similarly in all sectors. From the very beginning, it appraised under value to secure their risk and last they sold the collaterally taken property with unfair salvage value ignoring the owner comparable advantage” (Survey, 2023).

As *Table 4. 2* indicted below the finding result of the study on the purpose of conducted sectors’ property valuation indicated that in MHSC 40% compensation, 37% taxation, 13% rent 7% sale and 3% others. This implies the municipality of sub city that done the valuation practice for compensation and taxation purpose usually. The valuation purpose for rent applied in specific cases, for sale and other undefended purposes used rarely. The residents’ feedback in *Figure4.2* below shows valuation had done 61% for taxation and 12% for compensation their purpose of property transaction. The value of the compensation was minimal price towards the meaning of the society economic level and lifestyle destinations.

There are four contradicted point concerning the appraisal value of property in the Ethiopia constitution;

- i. (i). Land is for state and nation, nationalities and people of Ethiopia,
- ii. As the study by Ejeta (2020) related to property valuation in banks; land value has not considered in mortgage security, here also ignored the location value but land value and location value are different value inputs. The value of compensation is not including the flat land but it improvement because land common property state and people of Ethiopia prohibits for any means of exchanges.

- iii. The EFDR constitution stipulated the right and responsibilities that the controlling for monitoring and evaluating the sustainable utilization by state and applying suitable and productive land use for public.
- iv. The proc.135/2007 under EFDR constitution of compensation formula framework said that value of the property land value + improvement cost – depreciation cost. Because, above 60% of this study finding approved the main function purpose in municipality conducted in Ethiopia is the cost approach regardless of the purpose and appropriateness. As defined by RICS (2019) entire transaction detail should provide valuable evidence and accurate information the transaction of property being valued using comparison approaches.

MHSC finding results indicates the sub city municipality used the application of property valuation for compensation and taxation usually. Next, it used some times for rent, sale and rare for undefined case. According to the municipality feedback below in *Table 4. 2* briefed that methods valuation practicing shown that 20% in traditional, 23% modern/scientific, 47% mixed and 10% in other methods. The about 77% of the valuation used out of the traditional mixed and other customary practice based; the only 23% have applying the scientific methods. In addition, the scientific method according to the key informant (experts) mean that application cost approach for almost all purposes and types property value appraisal techniques with many limitations. Based on the recent studies review, the current bank valuation system related studies done in Ethiopia said that almost all banks found in the areas use cost approach type of valuation methods depending on the basis prepared by their organization particularly or Ethiopian Bankers Association manuals. Besides, targeted sectors feedback on valuation 60% of the valuation practice applied cost approach, 17% mixed (cost and income) approaches and 13% income approaches. The cost approaches provides the value by estimating the current replacement or reproduction cost of an asset minus the deducted for the physical depreciations.

The banks feedback results also shown 62% collateral, 14% taxation, 12% rent, 7% compensation and 5% sale, purpose of valuation. The finding results in *Table 4. 2* the banks have done the appraisal value of property in most cases for loan, mortgage and other means guarantee of collateral purpose. It sometime used for taxation and rent and rarely for compensation and sale in accordance the methods of valuation applied 60% modern/scientific, 26% mixed, 7% in traditional and 7% in other methods. The feedbacks for the banks expert *Table 4. 2* below encouraged it is about 60% but still the practices have not definitely applying the property

valuation methodology with required standards towards the right purpose of valuation assignment and professional Valuers, property valuation practice. The Besides, targeted sectors feedback on valuation approaches similar to municipality system of valuation, the banks also 57% of them used cost approaches for almost all purpose and 29% mixed (cost and income) approaches of valuation except two banks have used 14% income approaches partially for complicated business assignments. Based on a valuation study by Fanon (2019) Income approach has the best for appraising property based on the income generates or expected to generate for commercial real estate and rental properties, which is primary concern of inverters and investment. Therefore, for financial organizations and business oriented intuitions recommended to use income (capitalization) approach.

Similarly, the MMCA & RLRAIB key informant feedback shown that 13% sale, 13% rent, 26% taxation, 13% compensation and 35% collateral. The degree of difference over the purpose of property valuation practice has not exaggerated amounts. Based on the find results below in *Table 4. 2* about regional land and related property agencies, and city administration level of valuation have done usually for compensation and taxation respectively from the high to the lower percentage. The appraisal value for sale, rent and compensation purpose have same amounts.

The legal framework of the country set under the proc. 35/2007 for compensation value said, “Compensation for Buildings formula made the amount of compensation for a building shall be determined on the basis of the current cost per square meter or unit for constructing a comparable building” as repeatedly reviewed. The regional, city admin, and sub city level existing property valuation documents shows, a lot of directive and manuals published for temporary procedural guidance published in accordance. Overall content have no further detail about what method and procedure to follow during practicing property valuation and any other recommended point could helpful for appraisal value of specific circumstances as well beyond the conceptual meaning and general highlighting the at some extend.

Meaning of the legal definition in Tigrigna said that;

“The valuation of building property conducted on the construction design and calculated premises measurements that including the set volume and existing market study for appraisal value”.

According to the MHSC valuation expert interviewed that the procedure of valuation directly proceeding to the specification in cost estimation as grouped the technique as a cost approach.

Table 4. 2: Property valuation methods and practice

Summary Table of Respondents Feedback						
A Study assessment feedback of HSC Residents' questionnaires survey (community)						
1	If your answer "no. 2 in Table 4.1" community" is 'yes' what was the building standard?					
	Traditional	27%	Villa house	52%	Other	5%
	Raw house	4%	G+2 & above	12%		
2	For what purpose the appraisal value used?					
	Sale	12%	Taxation	61%	Collateral	6%
	Rent	9%	Compensation	12%	Other	0%
3	What was the existing function of the appraised building?					
	Office	3%	Residential	80%	Mixed	7%
	Commercial	10%	Industrial	0%	Other	0%
B Purposively selected sectors who expected to practice property (Sectors)						
	Key Informant feedback	MHSC	Six Banks	MMCA & RLRAIB	Brokers	
1	For what purpose the of property/appraisal valuation made					
	Sale	7%	5%	13%	23%	
	Rent	13%	12%	13%	67%	
	Taxation	37%	14%	26%	0%	
	Compensation	40%	7%	13%	0%	
	Collateral	0%	62%	35%	0%	
	Others	3%	0%	0%	0%	
2	What valuation method used in your office					
	Traditional	20%	7%	57%	10%	
	Scientific	23%	60%	13%	0%	
	Mixed	47%	26%	26%	0%	

	Other value compromised	10%	7%	4%	90%
3	What valuation approaches you practicing				
	Sale comparison	0%	0%	0%	0%
	Cost approach	60%	57%	65%	0%
	Income approach	13%	14	13%	0%
	Mixed approaches	17%	29%	26%	0%
	Other	10%	0%	0%	100%

Source: (Key informant, 2023) and (Survey, 2023)

The residents' feedback above in *Table 4. 2* showed that about 61% purposes of the valuation done for taxation. The taxable income Proc. 979/2016 for the taxpayers, specifically the rental building incomes tax is the gross income divided by the taxable of the rental building for the year reduced by total the amount of deductions allowed to the taxpayers for the years. The property valuation for taxation is under statutory valuation types. The actual amount investors receiver Sunder the rate of regular payable basis of idealized calculation of taxation. As defined by Antony Seely (2001) studied for net-of-tax return has important because it seen in the valuation book by David Isaac (2002) that used in the approach the conventional method of property valuation the income treated from the investment or corporation tax purpose same sources.

The methods of valuation applied 57% in traditional, 13% modern/scientific, 26% mixed and 4% in other methods. Collectively the regional and city administration valuation related experts proved that above 83% of the valuation practice going out of the scientific methods but the scientific only takes 13% of the property valuation. Besides, the targeted sectors feedback in *Table 4. 2* above study results shows, similar to the sub city municipality and banks 65% of the valuation system used cost approaches used about 26% mixed approach (cost and income) and 13% income approaches in unusual purpose of valuation appended. The Regional Standardization and Regulation (2003) about authorizing building administrator can assign the sell assessment for building property tasks for third party for legally licensed external expert under the stipulated contractual agreement without any more detail. Same way as MUDC (2005) standard for practice of the modern land and related property administration system would support cross-sectional inputs to enhance existed practice of the property valuation. Nevertheless, the action shown as doing with autosuggested observation dominated application

of valuation method; whereas the global studied standard requirement said compute using different method of valuation thus valuation accords have market evidences under the science and practical experiences.

The other target group of the study result of the key informant, property brokers indicated that 23% sale and 67% rent consecutively for all valuation purpose of survey results. The brokers have not professional property brokers but they are information. As the above *Table 4. 2* study result verified that the property brokers were 10% traditional and 90% others (costmary) methods based of system valuation practicing. Because, as study by Rotimi Boluwatfie (2017) anybody working as licensed brokers made property transaction for rent and housing without traditional and scientific measurements, methods and systems via simple observation under fast developing valuation system where the current we trying to exercise yet been counted as tradition approaches. The results of valuation approaches finding result of property brokers shown that 100% used other compromised of customary based out of the entire valuation approaches framework, it strengthening the costmary methods of valuation. As the information got from further FGD shows that many individuals becomes broker as temporarily property brokers, however the legal broker are not property brokers but those engaging randomly for unprofessional working types.

The survey results of residents about the function of the buildings property that made transaction were about 3% offices, 10% commercial, 80% residential, 7% mixed and 3% industrial property types. Even though, the procedural frameworks of broker have not well organized in studied and professional way that the involvement seems great. Because the finding results of the property valuation made by the brokers were for 23% sale and 67% rent purpose. Based on the survey results above in *Table 4. 2* about 80% feedbacks, 96% of existed documents about land use (*A2 Maps Figure (k)*) and map topological of existing similar building below in *Figure4.15* were residents building properties that the survey results in *Table 4. 2* above also verified these residential houses.

Based the different sectors experts' summary results on valuation methods 77% MHSC, 40% BANKs, 83% RLRAIB & MMCA and 100% the brokers have not used the scientific method of property valuation. The experts' summary result about valuation approaches has 60%, 13% and 24% average applied dependents on the cost approach, income and mixed both respectively. One

the other side, 80% of the RIPT feedbacks have residential building property. Most of the time similar age and scene of properties nature possibly found in residential area, which means the residential real estate, have usually the best site to practice sale comparison approach. As IAAO (2021) defined the sales comparison approaches valuation of property inflicted that comparing it to similar properties that have recently sold and exiting real market through the compulsory adjustment made to drive value that recommends for residential properties and other available type of real estate. Unfortunately, in this study finding the sale comparison approaches of property valuation have totally ignored from valuation system. Based on the survey results of the valuation approach in *Table 4. 2* above of indication of the practice of property valuation with application of sale data was not any consideration for property value. The advantage of digital and standardized system of property valuation have great role as the reviewed on the above thus the UK Center for Spatial Studies (2018) have modern required digital property information should provide easy access to comprehensive property data useful for all valuation purposes land use classification. According the system assessment and observation over the valuation system has not detail policy and structured institutional framework; it has the main causes for practicing backwards and unreliable property valuation system (Key informant, 2023). The proc. 35/2007 under article 7(4) and Tsala (2022) states compensation for permanent improvement to land shall be equal to the value of capital and labor expended on the land. This study has confirmed this basic finding result as part essential investigation.

Finally, almost all the sectors feedback results of including the regional and city administration survey shown that sometimes they apply cost approach for market study to set lease price benchmark, collateral and compensation. Nevertheless of rare used of income approach for service tax taxation. However, overall the property valuation practicing carried out with cost approach method for the majority of valuation purpose.

Based on the international standard and studies stated under IVS (2020), IVSC (2017) and RICS (2019); the entire valuation requirement to measurement the carried out assignment under the national and internationals and qualified Valuers. The selection of the valuation approaches and methods, appropriateness to the nature of asset, purpose of valuation and participants' interest used in relevant market and availability of reliable enough data to apply the methods under the value responsibility. As study done by Asres (2020), the banks valuation used traditional manual system based then valuation guideline have influence over the Valuers perception and practice

the value basis. However, the International Professional valuation Standards (PVS) not advised to reliance on one methods applying of the valuation of development property rather it has checks where possible using other methods of valuation should be an iterative process. Henley Wood, (2015) defined the cost approach particularly recommended that for the newly built or under construction building and special valuation circumstances. Therefore, the results of multipurpose valuation made by cost approach and implemented through traditional system on the other side have not well-done appraisal value.

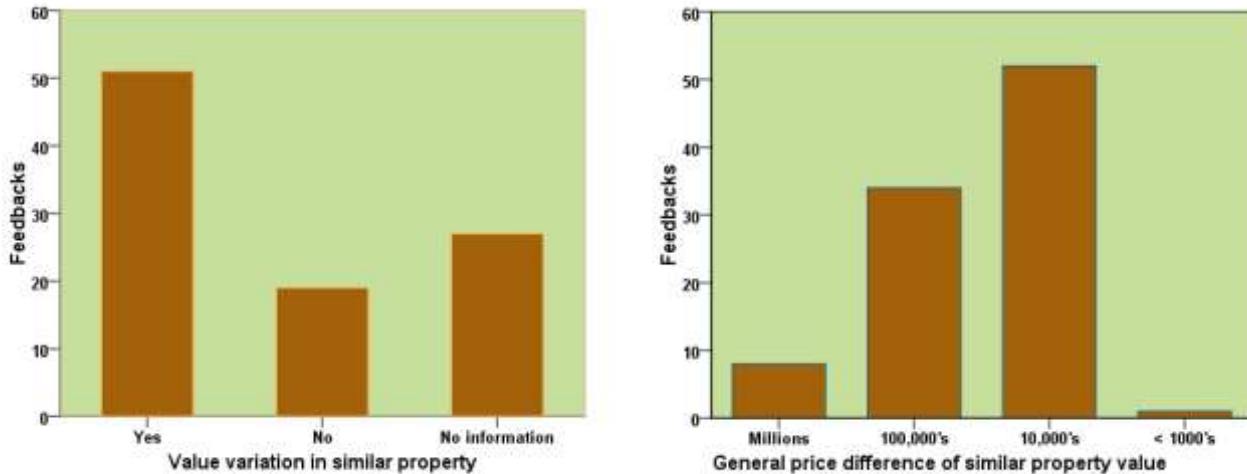
The value of the property estimated 5% of experts' assistance, 55% of owners' ordered, 2% Processors perception based, 25% both owner and possessors' agreement, 13% through broker facilitation and 0% of others based appraisal value done the transaction made for more look in *Table 4. 2* above. According to the transaction that gathered from both expert and residents respondents all methods findings results, observation, brokers, some document evidences proved in the study investigation. The summary results about standard and professional involvement during the valuation processed conducted that; the first 5% of the property valuation indicates thus made for compensation, some property valued for sale, and rent purpose under the case law of course orders. The next 55% of the transaction value by the owner and 13% of the brokers' assistance made property valuation were for the sale and rent purpose. However, in this transaction the possessors agreed to use the limited opportunity but not accepted as rational value property valuation. In this situation the owner and the brokers are touched the upper hand of the price decision making, unless the owner have to extra- fair person. The other 2% of them have on the pressure of the possessor may be buyer, rent, successor or other similar right degree of ownership over the specific property. The left 25% value of the properties made by both owner and possessor agreement. This valuation also made for rent and sale purpose under smooth consensus both parts.

4.3 Examine the property value variations in similar properties

4.3.1 Finding result of property value variation

The residents' respondent survey results in the Table 4. (a) below shown that the property value variation in similar properties finding shown then 56% feedback agreed with the value variation, 20% have not agreed and 24% have not information about the value difference among the valuation system. The detail content of survey data and responds more for assertion of the

evidence made different further dissuasion with selective responded. This briefed that that the 90% of the first 56% respondents in included the possessors residents, on the other side 10% then and 44% of the total respondent said not greed and nor information with high value variation in similar property were the owners of property (FGD, 2023).



Source: (Survey, 2023)

Figure 4.2: Assessment result of the Residents price value variation

According to the MHSC, findings result in *Table 4. 3* below shown as about 97% of the Valuers key informants have agreed with high property value variation in similar property, and the remaining 3% have not information about the variation in property value existed or not. As the above *Table 4. 2* the of methods and approaches of valuation practices have not enough in multiples dimensions because it under gone with old fashion valuation method, inappropriately single valuation approach based and unprofessional experts in all cases based implementation. As David Isaac (2002) defined in the principles of valuation book, the valuation is as not only science and technological outcomes but also an art of creating an opinion about the value of property in the ground to observation and examines the basis for appraising which is not possible by other individuals. This opinion seems reason for variation but it is slight difference expected in valuation practice standard not affected the outcome of the appraisal value. However, the variation in the finding was significantly too big and uncompromised difference in valuation standard, clients' benefits and science exercising the system. As Appraisal Institution (2020) and RICS (2019) the cost approach mostly recommended for compatibly equivalent property nature

like schools and churches when there are few comparable sales due limited market data, while the reliance of the application of single valuation approach has not advice.

The Six selected Banks in *Table 4. 3* below basic study concern was the presence of high value variation in similar property the surveyed output shows; the 26% agreed and 67% disagreed and 7% have not information about the difference of property valuation such cases.

Based on the banks key informants' perception property value variation considered these two basic things affected to express their perception as verified through further focus group and pane discussion.

- i. Primarily, the value variation within similar building property have not affect for bank as it sets first advantage for the bank rather than customer.
- ii. The value variation those banks considered value of property relative to the market value of the property with different factors like old market study and rate of exchanging with lower land value consideration.

Therefore, most of the bank respondents have ignored the property values variation during transactions. The researcher took the effort to synthesize the banks ground practice in terms of variation in the property valuation system. Actually, based on the banks institutional procedures without this manual or automatically reject the valuation assignment that mean they expected only to doing under the procedural order and the instruction bank manual. So that, even for the skilled and experienced experts have not allowed going beyond bank working manual. This the main reason for contradicted their feedback result of during structural and semi-structural interviews. Based on the further semi -structural interview and discussions details, the sub city municipality knew what the real price and the price registered in legal documentation. To the reverse, the banks finding result shows about 48% have ignored the value variation for similar property. Because, in most cases the property valuation purpose is for mortgage, loan and guarantee as collateral in general. Which mean the property valuation should give first secure the advantage of the banks at any situation. Unless, it must refuse the appraisal assignment; this the reason to limited the key informants could not speak loudly about the high value variation rather they shared their perception about the value variation of similar property out of the bank framework have exaggerated.

As similar research in conducted in Ethiopia's bank institutions proved that, the value of real property value valuated by banks is debatable due to variation between their approach and

existed market value in detail cost to develop a property. In most cases as studied by Amare (2021) shows different stakeholders complain about the value of the properties that are valued by banks done to reduce the fluctuation value financial institutions entails both over and under estimation issues occurred for banks advantage for risk security. However, proceeding by Ejeta (2020) studies reviewed that the owners and customers faced to dissatisfaction, inconsistency in property valuation and unbalancing with the current market condition. The banks valuation practices have almost cost approach oriented except two banks used income approach partially. Up on this the cost approaches has not recommended for all-purpose of valuation then it cause for devaluation the appraisal value of the properties.

Those purposely-selected MMCA & RLRAIB experts and official's feedback on the high value valuation in similar property shows 52% agreed and 48% disagreed with the existence of value variation. The survey results shows more the half were feedback agreed with high value variation. The other remaining was in regional and city has not agreed with value difference. For supporting the study with strong inputs more detail, discussion of the expert made in accordance. These evidences approved that the key informant accepted the value variation were specifically found most of them nearby experts with good understanding on the valuation system and practice. The other part of informant disagreement of the property value variation in similar property have affected directly by individuals responsibility, inappropriate experts positioning and lack of sufficient knowledge due misplacement of right expert at the right department. Also, as looking in *Figure4.2* the only 13% of the 23 respondents have recognized the scientific valuation system and as results from FGD approved this ground truth but it obvious on this misleading than the property value difference. Even through, it has old version reference, but shows many experts and the field area itself have discriminated and influenced professionally in real world practice under politicized environment. For instance, as MUDC (2005) proposed to create digital infrastructure said land and related property should be register in structured server and suitable database system through cadastral surveying, property resignation and certification and investigation through detail physical, fiscal and legal information of the property. According key informants of the standard and regulation, it have politically influence to exercise the theoretically written and other better system. Not only this but also the policy have old version content with limited volumes to address the complicated nature of property valuation. In most case qualification of to conduct property valuation under the proc. 137/2007 under article 2(3

(13(1) and as Belachew (2020) studied the Ethiopia has no standard valuation framework, regulatory institutions and professional valuation firms. The overall limitation insights the property valuation practice including the high variation of similar property were consequences of the discussed stack-backs.

According to the Property brokers interviewees results the provide evidences about the real practice and way of valuation as part of the property facilitators. Then the result shows, 89%% of the respondents approved the price difference and 11% have not information on the high value difference in similar property. Even though, the difference was not induce without any reason; whereas the brokers said the property valuation particularly property value for sell and rent purpose are basic section, which those involved directly and indirectly. There key as a joint for both transaction parts at the specified purpose of property valuation. On the other hand, based on the residents FGD perceptions the brokers are the main cause for high value variation, because the intention of them only commission focused then to earn more commission they distribute and apply situational exaggeration of price and unreliable information about the comparable property. As detail discussion made with general broker finding, they counts themselves as property broker then said that as government controls the illegal brokers the high value variation would be best to reduce in high degree.

The residents finding results in *Table 4. 3* below about the general amounts of price difference for similar property value shown that rough were 7% in Millions, 40% in 100 Thousands, 52% in 10 Thousands, and 1% less than Thousands variations have appraised value of the property. Accordingly, the residents respondent suggested result that the general price difference of similar property shown about 99% greater than 10,000s differences. This difference could be as a result so the difference challenges. It has no standard and detail explained valuation framework in Ethiopia, based on the above reviews indications also a possibility of inaccurate opinions of value estimates that has significant consequences. *Table 4. 3* about the resident as property clients' professional service provision indicated that 36% got service delivery, 16% not provided service and 48% have not information of the professional service provision during the property transaction. As further information gathered through conducted FGD, the community respondents have not understanding over valuation required professional expert other than the law procedure to facilitate legality of the process. Even through, the professional delivery has a lot of deficiency but also most of them did not consider valuation could assign for other purpose

rather than taxation and compensation. The level of satisfaction from the 36% who served by experts shown that 0% very high, 2% high, 27% average, 12% low and 59% very low. Overall, even 36% of the service provided about 70% client respondents feedback was below low degree of satisfaction. The practice of unscientific valuation system lead to highly devaluated results of appraisal value. Because, the practice without legal procedural framework, implementation standard, professional requirement and technological suitability. The customers and institutions have dissatisfaction due the implementation induced gabs as well as the contradiction of results and expectation due the misleading of the principal valuation system frameworks caused for dissatisfaction.

The resident respondents survey result below in *Table 4. 3* about the client who were not provide expert service during their property transaction indicated that 55% Owner based, 7% possessors based, 25% Both Owner and Possessors agreement, and 13% Brokers facilitation. This means that usually almost half transaction value of the property made under the decision of property owners. Some in case both transaction actors agreement have a possibility to bargaining to reach at the decision over the transacted property as the study fining indicated. Accordingly, the brokers have good contribution for connecting the both transaction actors and sharing experiences of comparable property. As similar studies like Aster (2020) indicated that brokers have significant role and understanding of the property market, however, it is not a valuation rather possible to take as considerable suggestion. The final sales price of properties negotiated by seller and buyer may accept or reject, as the system is open market disregard the scientific valuation practices.

Table 4. 3: Examine of the level value variation over similar property

Summary Table of Respondents Feedback						
A	Study assessment feedback of HSC Residents' questionnaires survey (community)					
1	Do you agree with the presence of high value variation in similar property?					
	Yes	56%	Not	20%	No information	24%
2	If answer no.'1' is 'yes', how much is the general amounts of price difference roughly?					
	In 1000,000's	47%	10,000's	23%	> = 1000's	10%
	100,000's	20%	1000's	0%		
3	Did you have professional service delivery support during the appraisal value?					

	Yes	36%	No	16%	None information	48%
4	If 'yes', how you rank the degree of satisfaction?					
	Very high	0%	Average	27%	Very low	59%
	High	2%	Low	12%	Other	0
5	If 'No' or No information, how do you appraised the value of your building?					
	Owner (O)	55%	Both O & P consensus	25%	Others	0%
	Processors (P)	7%	Broker	13%		
6	If the level of satisfaction is average and below; what was the main cause you perceived service dissatisfaction.					
	Fairness related	55%	Valuers capacity related	20%	Other	0%
	Transparency based	20%	Valuation system based	5%		
B	Purposively selected sectors who expected to practice property (Sectors)					
	Key Informant feedbacks	MHSC	Six Banks	MMCA & RLRAIB	Brokers	
1	Do you agree with the presence of value variation in similar property?					
	Yes	97%	26%	52%	89%	
	Not	0%	67%	48%	0%	
	I don't know	3%	7%	0%	11%	
2	If 'yes', how much is the general amounts of price difference roughly?					
	In 1000,000's	33%	33%	0%	33%	
	100,000's	10%	26%	21%	45%	
	10,000's	20%	26%	21%	22%	
	1000's	0%	10%	0%	0%	
	> = 1000's	37%	5%	58%	0%	

Source: (Key informant, 2023) and (Survey, 2023)

As reviewed different studies conducted Ethiopia (2020) and legal frameworks indicted that the Valuers are not property valuation experts and property valuation ambiguity of over and under value estimation thus led to dissatisfaction of both part the owner and customers. The land and land related valuation of existing land value have not well defined value and development trend based allocation that done inappropriately for land property value. The FRDE Constitution

(1995) inclusive vested property of state and people of Ethiopia, the right for improvement the land has granted. Nevertheless, the land prohibited for any mean of exchange except succession for legal stipulated relatives. Therefore, under such valuation practice, the confusion and dissatisfaction have the expected as results of traditional, unprofessional and autosuggest method of valuation practices.

At the same time, the authorized valuation approaches mainly practices to estimate value the property valuation. The property valuation practice as results of cost approach applied by quantity survey (BoQ) method that formulated under article 135/2007 of compensation for expropriated land situated building value formula under Article 2 (13) 2007). Due to this case, land value has not considered in mortgage security; as study by Aster (2020) shown here also ignored the location value but land value and location value are different value inputs. On the other hand, some empirical studies show that with this the very important assumption to understand the market value of land or hence the market price is higher than the cost of acquisition and infrastructure under the provision. It is not exact costs are higher than market price, it shown the land is not set economically sustainable as defined by world bank study (2014).

4.3.2 Similar property value variation analysis existing data

4.3.2.1 Analysis of existing document for MHSC

The overall records of sales data of transacted property in the selected year with similar property area, zone, quality and equivalent design, number of rooms and sales periods. The value of sales property have mistreated with high value variation, due to low output compare to the real value of the subject property.

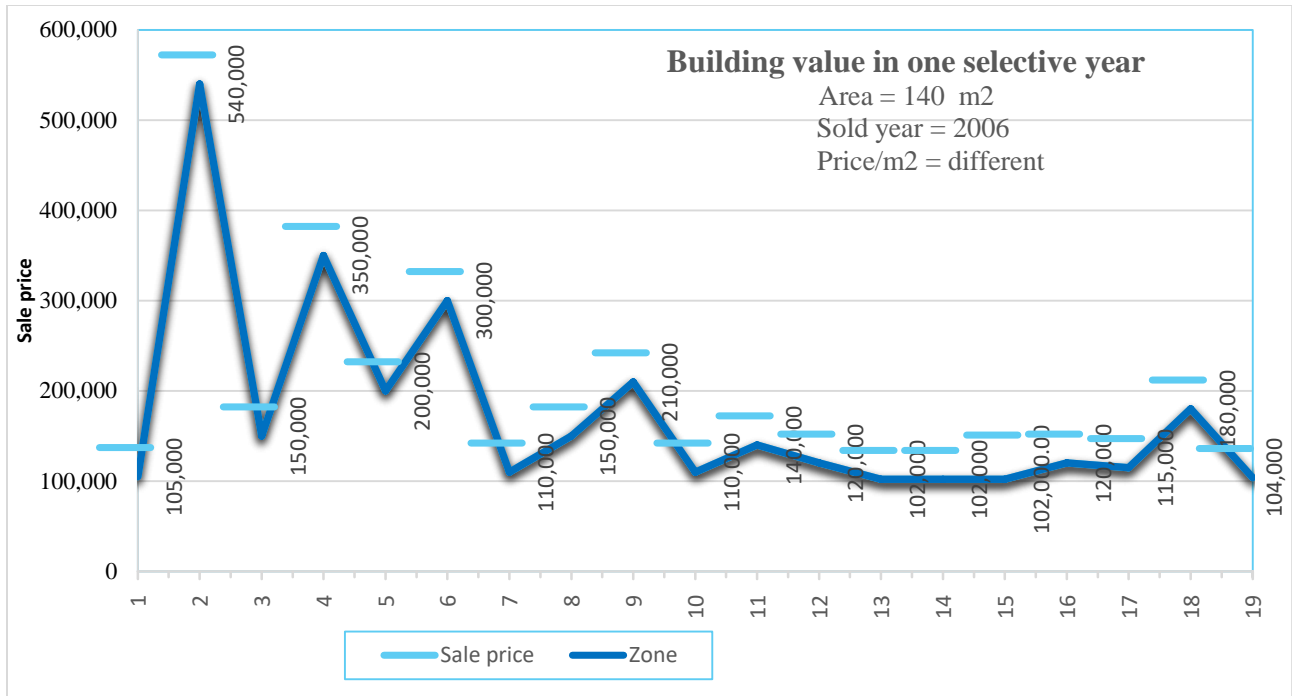


Figure4. 3: Examine of similar property high value variation

Source: (MHSC, 2023)

As indicated in Figure4. 3 above here most people have not the valuation framework noticed as professionally working and importance of system for property administration. That almost all sale value of each property has a big amount of sale price difference. The average sum of the total 201 questionnaire plus key informant respondents survey result approved that 80% the variation with the minimum value of 100 thousands up to 1,000,000 s' of general price difference. Up on the discussion, from remaining 20% s', 5% of them are due to lack information and the others 15% of them were not take into account the gap being made in their valuation practice and professional valuation practice. They have restriction professional and frame working to role more beyond the writing report according to the manual. However, a sort of manual has not functional demanded of suitable standard valuation system, skilled and knowledgeable professional competent Valuers. The figure of transaction of sold property has not only the different among the similar property. It also has, big different within the official recorded here in municipality and the real sale agreement among both owner and possessors. Example, among the sale and rent house reduce sell price doing by tax avoidance.

4.3.2.2 Property value analysis from private offices of consultancy existing data

The exited sale data record shows two categories of price difference. First, the difference between similar property and Second, the real price of sale property and it price registered in official documentations.

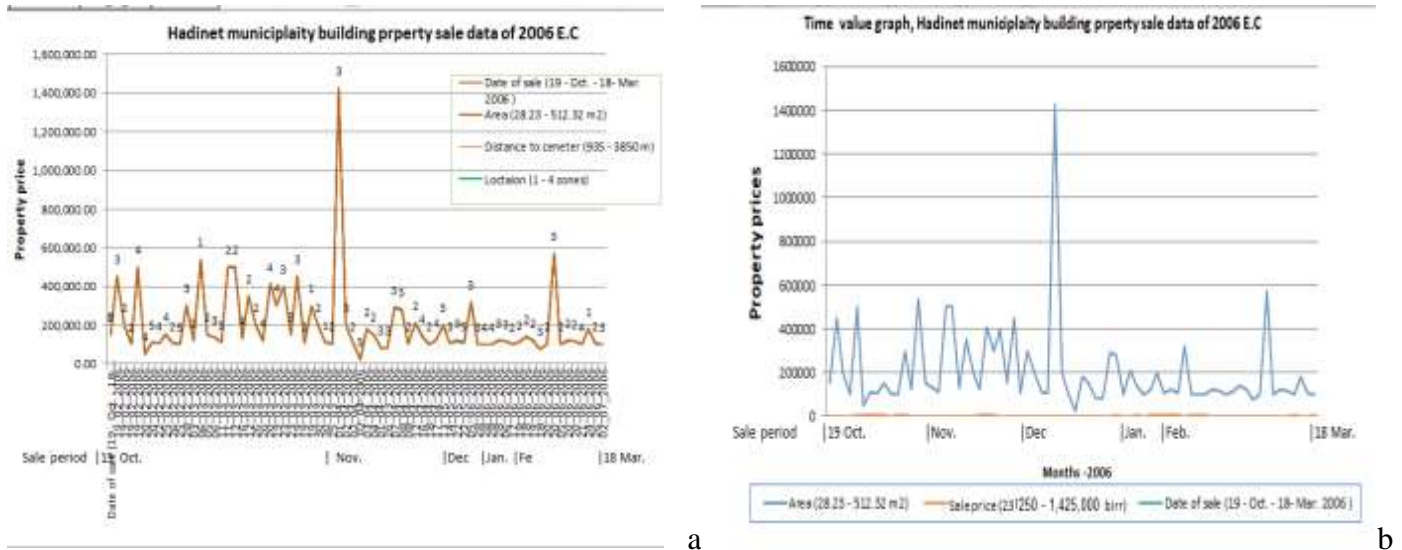
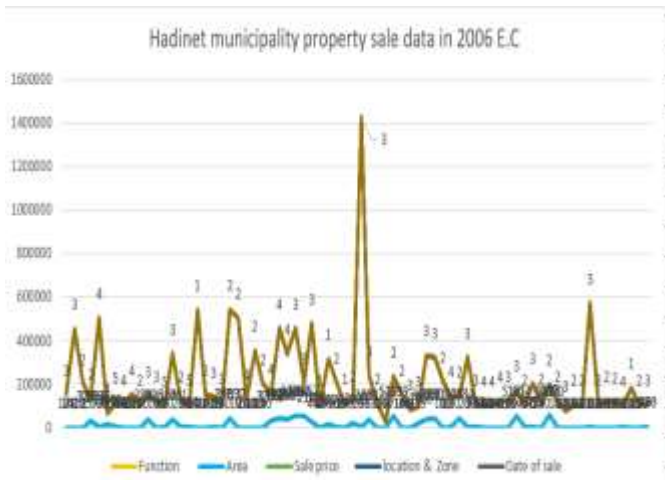


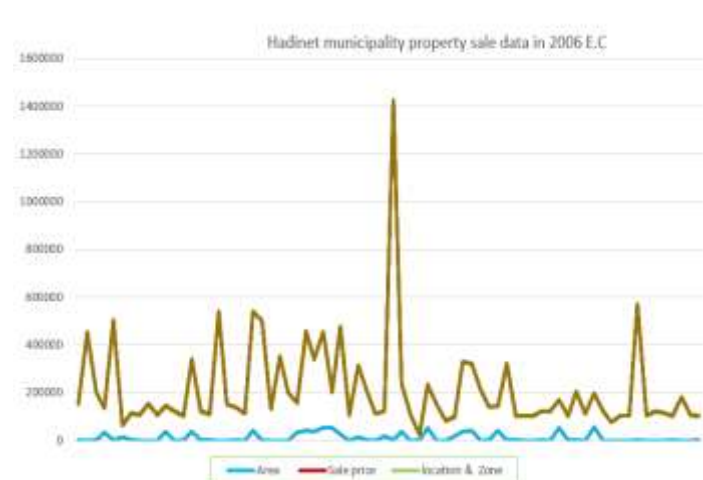
Figure4. 4: Property value variation of MHSC sale data similar property

Figure4. 4 (a) above shows the only zone of property is not matter to define property value, the maximum price of the sold property at the parcel location of from the center zone -1 up to the far one zone -4 the biggest amounts of 1,450,000-birr (as seen in Figure4. 4 above). This amount got where the price value of the property have officially registration.

Example: based on data in Figure4.9 below map shows the difference in sale value indicated proportional with the area but the price is reverse related to time value. The numbers in the graphic shows the property have sold by the approximately by 8 00,000 for 200 m² to 250 m² areas during the sale date of October month at the end of November, proportionally 800,000/200 m². Similarly, the beginning and ending of Dec Jan. & Feb. in months the property sales of 200,000 – 420,000 birr amounts for plot area of 80 m² – 170 m² range proportionally. Comparison ratios of both sales are 4000 birr/ m² and 2500 birr /m². The price difference over the former and second plot area reached about 1500 birr/m² difference with in similar locations of the properties must considered basic factor to identify the property value in some case with limited measurement value. This value variation seems exaggerated; however, looking case stay– B in literature review has the real appraised value building that can easily approve this truth.



(a) Existing similar property



(b) Value variation of similar property of sale price

Figure4. 5: Similar building property with highly different sale price

The above Figure4. 5 shown that the sale data found from MHSC and Ethiopian construction and urban housing development in 2011 since 2002 – 2011 E.C. The purposely-selected sale data of 2006 E.C for better comparison with other sale data to compare the property value difference. This transaction made same period of a year and similar property. Based on the field observation made in specific cases proved the sale values of the building property in closed location and comparable nature of a property reaches in 100 thousands price differences. During this valuation examine made consider overall the relevant attributes and features that could add value and representation the actual contents of building properties were under consideration; the differences were very high value variation yet.

On the other hand, the data from Hadinet sub city municipality 2011– 2023 E.C. The sale period of property is 2012 indicated that extremely increasing the property value and variation in among them similar properties. The sale data of building property from private consultancy and secretary office that has different in value but similar in size, type, and location.

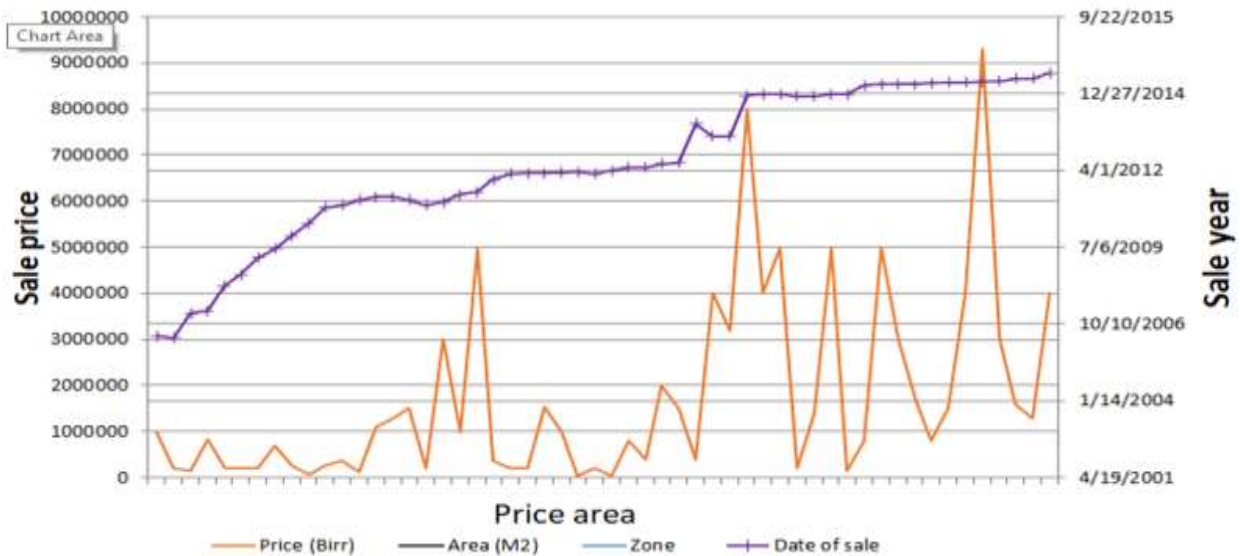


Figure4. 6: Real sales data of building property private consultancy office

Source: (Meron, 2023)

The above Figure4. 6 examines the sale date, area and price of building property over similar property. The sale value of the building property in 2012 period in A2 Table 4 around last page shows that; the 2nd land grade of the existed building zone of the city. The sale period of property with only had a month and week time extent the property has transacted at the area of 245 m² and 200m² sizes. The property with area of 245 m² by price of 1,000,000 birr and 200m² area by price of 200,000 birr sold-out. Therefore, the price and area ratio of the two properties value indicated that 1:4082 means the 1m² by 4082 birr and the second 1:1000 means the 1m² to 1000 birr ratio. These variations have critical consideration of property differences in content.

This part helps to show the actual price value of sale property and property sale date of years from 2001-2020 E.C form Hadinet private consultancy office data collected. The survey result of the graph for the consecutive 10 years from 2011 - 2023 shown the value has increasing with time from 1, 000, 000 to 9,000,000 million. It predicted to be 10,000,000 birr by 2017 the value of these properties with area of 140m² while similarly the incremental trend of the property value approved. Based on above in Figure4. 6 finding proven using the data from Attorney and contractual agreement consultancy office that shows the size of the property are 140 m², the location (zone) and the price has high value variation of property. The lower sale price started from 80,000 and the big price reaches 9,300,000 birr. The general price difference have reached in millions amounts.

The price value of sale property has big amount of differences with similar property. The above *Figure4. 6* about amount of price have in millions difference. In addition, the price value fluctuated that the time and size value has not adding the values of a property that goes accordingly.

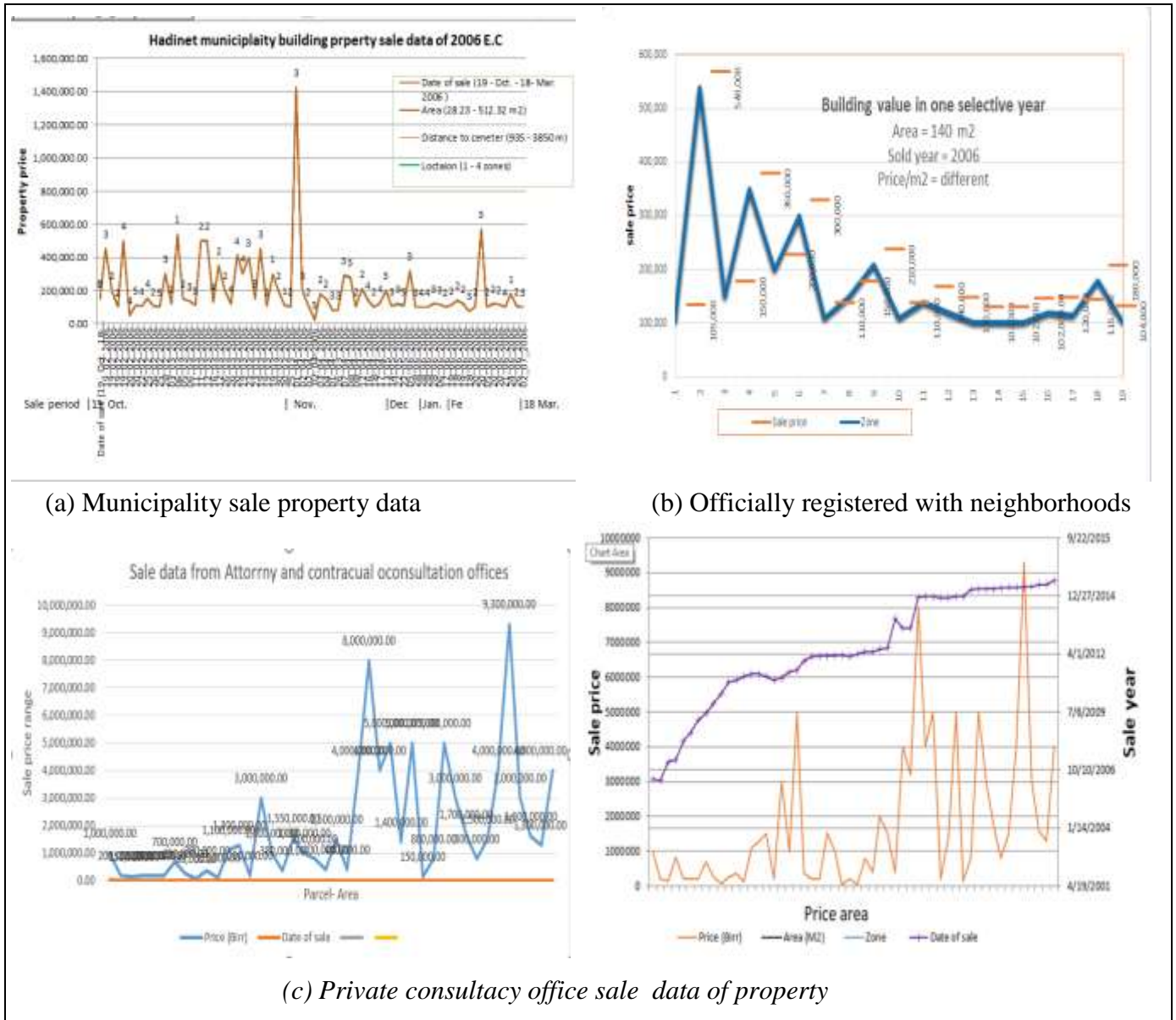


Figure4. 7: Existed sale and officially registered sale difference in similar property

Based on the data in *Figure4. 7* (a) above shows these properties found at similar location their value which shows that the sale value of the municipality record data. The sales data in *Figure4. 7* (b) above indicated the presence of 100 thousands different price value of property. However, the different among the officially registered sale amounts of properties are relatively small

reached about 200,000-1,425,000 birr from the smallest to the biggest respectively. Whereas, the private consultancy office sale data (real sale data) in *Figure4. 7 (c)* above shows, the real difference in millions birr. It reaches about 1,000,000 birr minimum and 9,300,000-birr maximum sale differences.

The transaction history of the existing data collected at municipality and private consultancy offices level shown that the real price amount of the transacted property that registered in two ways. The price registered process preformed twice censuses agreement; the price amount of building property registered officially in municipality have the deduction amount under the consideration of the exchange tax reduction latter and the real price sale price would done through oral agreement among the two parts, the owner and other.

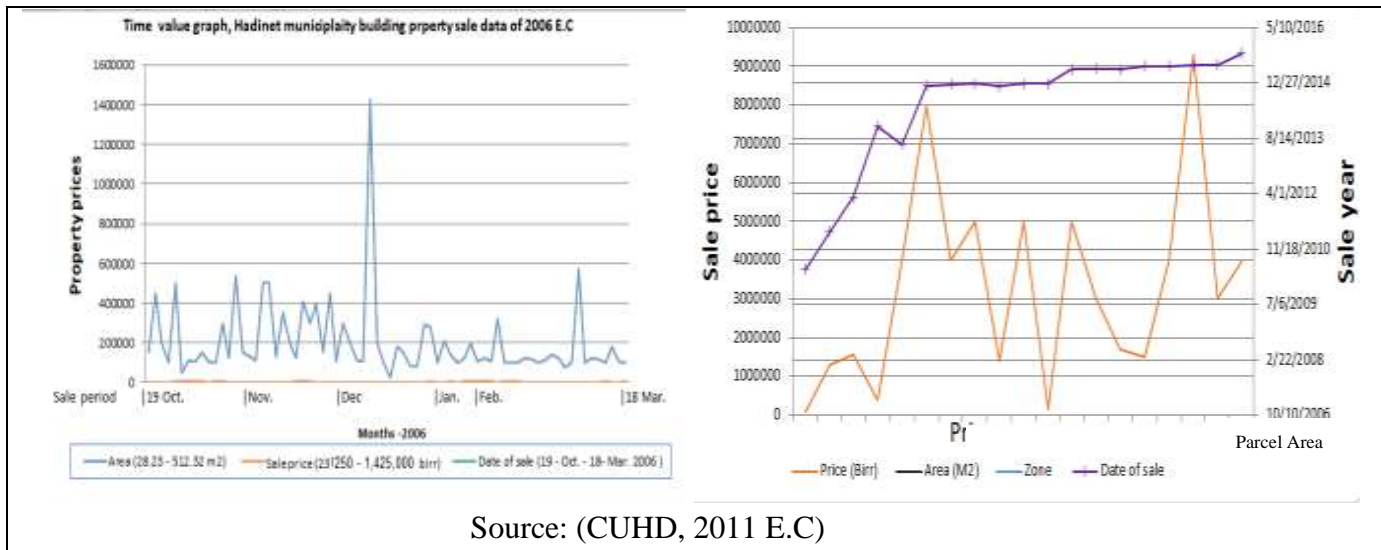
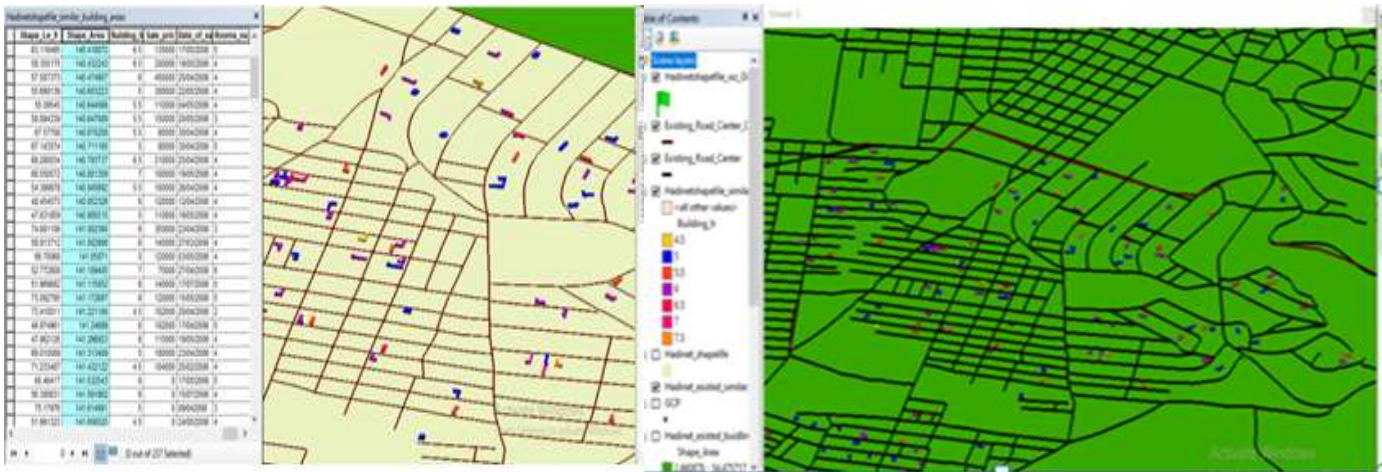


Figure4. 8: Comparison of municipally and private consultancy offices sale data

The sale price of the building having similar property value data collected from Municipality of Hadinet and other documents data collected were very different. Consequently, drawbacks becoming because of the poor property valuation system that the sale price of property, which officially registered, has extremely different from the contractual agreement of both parties these who sold and bought the property. Therefore, the property value have neglected in two ways in the same time.

First, the prices have not uniform value of every property equivalently. Second, the property value has not effective system and controlling mechanism to be having the same sale price in officially records and bargainers agreements as approved on the above discussions.



(a) Value variation map of buildings

(b) Topology of the similar property

Figure 4.9: 3D building model and similar building property maps

This map shows similar property at similar location of buildings sets valued disparate. The attribute data of the GIS database indicated the sale price, area and sale date of property. First, in *Figure 4.9 (a)* the same color building represents similar size, area, quality, function and location (zone) of property. This indicates also the distance from the main road to particular houses. The *Figure 4.9 (b)* indicates the building model of the houses that including the roads network and zonal description to understand the cost of appraisal value.

The banks experts' feedback on the *in Table 4. 2* above about general amount of the property value variation as follow, 33% in Millions, 26% in 100 Thousands, 26% in 10 Thousands, 10% in Thousands, and 5% less than Thousands rough price difference appraised value of the property. As the banks, respondents have not agreed with high property value variation in similar property and as confirmed in interview and focused group discussion. The experts' informant in value variation and general price difference in banks has contradicted each other. According to this, the researcher led to focused group discussion, the cause for dimension of the high value variation in similar property and location incompatible based on their confidentiality of institutional framework and the ground reality. As reviewed on the literature, similar property valuation study conducted related to banks valuation system in Addis Ababa and Hawassa (2020) proved that the bank Valuers have limited power and professional freedom to exercise the valuation by authorized bodies for the sake of competitiveness of similar institutions. Particularly, private Banks would not use depreciation value of the real property due to the interference of management for the bank advantage, and there would be competition between each other to lend

their money and treat their customers. Similarly, as study conducted in Ethiopia by Aster (2020) shown, valuation system have not well trained and capable placement of experts to make detail insight interpretation property value procedure and professional integration. Example, Banks in Ethiopia use similar procedures of mortgage valuation where they adopt the working manual from the most experienced banks. As the banks, key informant feedbacks supported than other than these 26% of the support the value variation have not based on their bank institution practical situation. During focus group and paned discussion the respondents have sufficient knowledge and shared the right opinion about real practice of property valuation side the banks. However, the reason to limited respondents feedback said that the bank have considered and serve fro who are agree with the bank requirement for loan and mortgage where not expected any difference. It was the reason that they ignored the value variation were not including the outside valuation practice rather depending on the bank valuation conducted for collateral toward the banks risk security not the market value of property.

The general amount of price differed feedback results of the key informant from MMCA & RLRAIB 21% in 100 Thousands, 21% in 10 Thousands, and 58% less than Thousands rough price difference general amount of the appraised value of the property. According to the feedback on the high value variation, similar property the regional and Mekelle city administration have equivalent also on the number of general price difference about the property sales. This means that not the valuation methods have been running in properly scientific procedural practices. As documents from standard and regulation, offices briefed for more information the above about the valuation methods and approaches indicated that not varied from the overall the country and local implemented with many drawbacks the yet. According the information of the regional standard and regulation office documents indication; as reviewed document of MUDC (2005), and Regional Standardization and Regulation (2003) there have been trial for practicing the modern land and related property administration system would support comprehensive way to improve the whole land and related property system with required quality and standards.

The brokers' feedback proved that of the general difference price 33% in Millions, 45% in Thousands, 22% in 10 Thousands appraised value of the property. The property brokers, particular illegal brokers have highly influence the property market through misinformation the property value. The reason for that, the broker has to earn high commission with single property

as price increases. Therefore, these have highly affected to ensure the value of similar property appraisal value based on the exact location value, property type, function, quality and size. The cross finding evidence of the collected data shown that shown this reality. As result, the neglected market information thus the land market, building rent, building sell/buy price and directly influenced the cost of goods and services. As research by Aster (2020) studied, Even though, brokers have play big role in property transaction brokers that the actual transaction of the real property does not indicated the market value, it very high due to the brokers intervention. Brokers have been playing significant role for skyrocket actual price of sale price property.

The findings result of the 100% of the property brokers key informant indicated including those who were disagreed with high value variation in similar property had proved that the general price difference have with big differences that might reached 10,000 – 1000,000s price amount appraised value of property.

Generally, the principles of valuation RICS (2019) said the mandate of selecting appropriate valuation approach is responsibility of Valuers with clearly stated approaches. In addition, as the data from MHSC (2023), present Legislation have been updating with limited improvement that from EFDR proc. 4/2005 the professional requirement for Asset property valuation consultants should professional Civil Engineering or related , Professional mechanical engineer, professional quantity surveyor, Graduate engineer and accounts (IFRS certified) or three years working experience. The proclamation and legislation have general concept that shows only general direction of valuation most focused on frameworks concerned on the compensation and taxation. These strengthening by the study done by Balachew (2020) said, “Property Valuers in banks are Civil Engineers”. Accordingly, they have not professional relevance for property valuation. This shows not institutional and procedural framework of appropriate placement of professionals. Therefore, the high value variation in similar property has obvious under the level of practice. The mentioned complex and semi-natural challenges of property valuation might take time to eliminate but it is possible to reduce through gradual process of lifelong the social activities.

4.4 Assess the major factors cause for property high value variation

4.4.1 The impact of property characteristic for value variation

According to study finding below in *Table 4. 4* that the main cause of the resident respondents’ service delivered that 71% of feedbacks were below low degree of satisfaction. The reason

according to finding result below in *Table 4. 4* about the subject property appraised for about 64% was without any valuation requirement, even the other respondent group under who service deviled were not the permitted them the system to apply scientific enough. As other previous studies reviewed, the existed system of property valuation has not maturely built in practice.

Besides, as the survey data below in *Table 4. 4* the resident respondents' interest over advanced or modern system of valuation shows 67% interest, 23 % not interested and 10% of them did not know their interest. It community respondents readiness to utilize the modern valuation of property valuation, indicated that very attractive as scenario. Whereas, the deployed for implementation and provide awareness through professionals and officials notation must be very effective. The feedback over the expectation from advanced property valuation system have expected that 63% to solve the unfairness value of property appraisal, 4% solve the devaluation of property, 8% to balance economic value, 20% to consider market value and 5% others defined as based on the residents feedbacks. This expressed the level of unfair valuation practice have influencing highly over the application of the valuation practices.

Consequently, the main causes for the existed system evaluated due to that the 55% related to fairness, 20% system transparency related, 20% capacity of valuation experts related and 5% valuation system related causes. The RIPT respondents' perception shows the system of the property valuation has not done fairly. To that extend, 40% of them it have also not transparent and skilled experts. The impact of the property valuation have not considered as big deal; as discussed on the above also, the community have not well-aware of the property valuation has needs particular specialist. That why, the property valuation system could not impresses them as limitation for valuation practice.

Based on the owner and possessors below in *Table 4. 4* about their client expectation for newly launch valuation system have about 33% high value, 67% fair value of appraised property value. Most of them were interested to have fair value of property. However, some of them have ambition to earn high value beyond the expected value. The reason for the different may be varied but as discussed for some residents they need to cover their tax fee and inflation induced financial burdens.

As further FGD done for more detail information about the property value variation with selective individuals; which are 80% of the individuals respondent were property owner they

would like to keep secure the value difference. Because, the sale price the property transaction made in various period records were real sale price and official sale registration has completely not related for details look on the above *Figure4. 7*.

Even though, most the property owner and possessor have awareness about the property valuation. However, they did not know the method and science, if it devaluated their property. Old version of valuation system of limitation has influencing for both parts due to lack of common regulatory and technological support to be concerned on their pursued benefits.

Table 4. 4: Existing property valuation practice system challenges and opportunities

Summary Table of Respondents Feedback					
A Study assessment feedback of HSC Residents' questionnaires survey (community)					
1	Could you use it if the advanced system of property valuation introduced?				
	Yes	67%	No	23%	No information 10%
2	What do you expect to solve the technological support valuation system?				
	Solve unfairness value	63%	Balance economic value	8%	Other 5%
	Solve the devaluation	4%	Considers market value	20%	
3	What do you expect, if well-built valuation system solved the problems?				
	High value	33%	Lower value	0%	
	Fair value	67%	Other	0%	
B Purposively selected sectors who expected to practice property (Sectors)					
	Key Informant feedback	MHSC	Six Banks	MMCA & RLRAIB	Brokers
1	What are the major causes for building property's high value variation of practical framework?				
	Absence of define quality	0%	0%	9%	22%
	Absence of define size	0%	0%	26%	33%
	Absence of define location	27%	5%	26%	44%
	Absence of define value	0%	0%	39%	0%
	Absences of define property type	0%	0%	0%	0%
	All the above list and others factors	73%	95%	0%	11%
2	What are variable have to consider during value appraisal?				
	Location	10%	0%	35%	45%

	Quality	23%	93%	26%	11%
	Area	0%	7%	21%	22%
	Age of building	0%	0%	9%	22%
	All variable and Others _____	67%	0%	9% legality	legality
3	What the main limitation to solve the existing challengers property valuation				
	Suitable working system	10%	7%	13%	33%
	Professionals competency	0%	14%	4%	11%
	Organized intuitional framework	23%	5%	35%	22%
	Property valuation policy	0%	2%	9%	22%
	Advanced technology	67%	52%	39%	22%
	Others _____	0%	5% awareness	0%	Illegal brokers

Source: (Key informant, 2023) and (Survey, 2023; Survey, 2023)

The main causes for high value variation in similar property according to municipality key informants defined that the main reason evaluated as follow, 27% absence of defined location and 73% absence of all the defined and other undefined factors in *Table 4. 4* above variables cause for high property value variation. The municipality valuation practice highly affected all the absence of undefined of type, area, value, age and other undefined building property variables. Furthermore, the undefined locations have significant impact over value variation in similar property. A research by Mohsen Eshraghi (2024) indicted that the land and related property registration and cadastral system have not held in Ethiopia; cadastral system described as a set of records and maps contained about ownership, boundary, value and land use of land parcels in jurisdictions.

Besides, the MHSC key informant feedback about variables that consider during value finding results the building property 10% location, 23% quality, area, age and 67% all collective impact of these of all the listed variables particularly building location and quality have consecutively affect the value of the property. Because, the location define the where the building been placed that defines the characteristic of that create high property value credits.

The response from banks key informant above in *Table 4. 4* shown that the variables caused for high value variation in similar property evaluation that absence of define quality, Absence of define area, 5% Absence of define location, absence of define value, absences of define property

type, 95% the entire above list and others factors. The summative result of the causes for property valuation in banks has including geographic, technical and methodical constraints. These variables have mainly considered simultaneously in banks than the municipality; still the LIS of the of the surrounding have affects the same as the absence of registered national data infrastructure that is source of all national evidence as a source of accurate, reliable and complete data for private and public sectors. The building property 93% quality and 7% area considered as main inputs, though that the building quality have contained the great degree but area has the most valuable input building were the most significant variables that considered during property valuation in banks institutions. Because we sail the application of the valuation focused on the cost approaches then it considers the material quality, price and the area covers as benchmark to estimate the value. In addition to this over all the community, awareness have influencing the valuation comparing the value of property in free market and the value of same property under collateral terms and condition. This was main reason for confusion the difference among estimation value for collateral and other purpose of appraisal value have not the same ground from the beginning. This was another impact of over for the process of valuation implementation in banks additionally defined by experts.

Based on the MMCA & RLRAIB respondents feedbacks above in *Table 4. 3* about the cause for high value variation in similar property variables evaluation dealt that 9% absence of define quality, 26% Absence of define size, 26% absence of location, 39% absence of define value. The absence of all these property variables limitation have exposed the property valuation to conduct with high value variation process. According to the regional and city administration, summary finding shown the existed building property have not well defined quality, size, location and value to that extent it lead high negative impact over the property valuation practices. Equivalently, the regional and city administration key informant results in *Table 4. 4* about the impacts of the variable during appraisal value of building property shown 35% location, 26% quality, 21% area, 9% age and 9% other like legal procedures and practice of the valuation system all collective impact. Generally, the cumulative effects of these variables have been affecting the whole valuation assignment results due to these absence defined these property valuation variables in addition to the others defended and undefined challenges.

As the brokers survey data above in *Table 4. 4* shows that the cause for high value variation in similar property variable evaluation dealt that 22% Absence of define quality, 33% Absence of

define size, 44% Absence of location, 11% define Absence of define value. The brokers have considered the valuation system and the value appraisal have been the accurate value of the subject property. The feedback indicated that the gap of property valuation paratactic was the quality, size, location and the value as well. Based on the further discussion with brokers in most case the brokers have not knowledge and skill of property value appraisal rather they considered the theoretically comparable and suggested price of building properties, which exaggerated the price of properties to compute their commission in accordance without any ground of market value. However, additionally grievance over the weakness of the legal authorities' role for neglected the transaction of property market.

Additionally, the brokers' informant perception above in *Table 4. 4* about the variables have to consider during valuation of building property shows about 45% location, 11% quality, 22% area, 22 % age and also other like illegal brokers have great negative impact as parallel with the property variables. Even though, the locations have highly affected, the area, age and quality of building have also the most considerable variables the building valuation that anyone with information of a property to sell being mediated as broker. Because, everyone have information about property to sell would broker even for that instance. Because, there is no any restriction and legal procedure that determines the amount of commission decided by the brokers that individual became broker to earn the commission as per demand. Because, the practice gone according everybody in that area have doing personal suggestion and interest instead of following scientific methods, standard requirements and legal procedures.

Based on the sectors MHSC, Banks and MMCA & RLRAIB conducted interview in *Table 4. 4* above result they have recommended their best solution according to the practice and limitation in their each office, and according their understanding of the valuation professions and its required criteria that the international and the discipline demanded standards.

According to the MHSC experts key informant of the targeted area recommendation indicated that 10% Suitable working system, 23% organized intuitional framework and 67% advanced technology. The message form this feedback brings the system and institution of valuation should be enhancing to better stage. Overall, the technological support of valuation system was too late; it has to improve and adopt better and suitable hardware and software digital system for advancing this critical entity basis of one community. Similarly, the banks interviewees result conducted to access the advisable solution of the experts of in targeted area indicated that 7%

Suitable working system, 14% Professionals competency, 5% Organized intuitional framework, 2% Property valuation policy, 52% advanced technology and 5% others. The banks respondents focused as well the technological advancement have not compromised topic that could push the valuation system forward to get better implementation practice in all relevant property valuation exercised sectors. Additionally, they recommend that the property valuation experts were not skilled and knowledgeable experts. They need capacity building trainings and professional experts support them for practicing scientific and complete valuation system. However, the banks were the batter place that property valuation would have better preformed through quality practice of the property appraisal value. Lastly, according to MMCA & RLRAIB key information about the effect of poor property valuation system directly influences the community and then over the national economy. This problem required urgent solution by carry out the presents and future resource value. The interview result conducted to access the advisable solution of the experts of in targeted area indicated that 13% Suitable working system, 4% Professionals competency, 35% Organized intuitional framework, 9% Property valuation policy, 39% advanced technology required for present property valuation system. Overall, the system has not progressing well that have multiple drawbacks and following very old system yet. The most impactful advice by the expert to solve the system of property valuation has to introduce of advanced technology support and property registration system.

The sale evidence of building property has highly complicated nature and lower reliability data recorded. The focus of the study was high property value variation in similar property. Unfortunately, the finding results in *Figure4. 7* above dealt about real sale data and officially, registered data indicated that the transaction price of building property that officially recorded and agreement parties agreed value has extreme different.

Currently, the property administration and trend of accuracy found in increasing rate exponentially demands. The causes have due to the population increment and high pressure of world trend changing life style and inspiration towards holistic growth. Therefore, adoption of suitable and sustainable system of real property would be essential. This study helps to direct suitable and modern system of property valuation. In addition, it required well experience, practically skilled experts, suitable technological system and feasible policy.

The high value variation of building property occurred due to diffident variables like topography, existed market value, land value (desirable location, topography etc.), variety in material value,

locational accessibility, and closeness to downtown, security issue, transportation costs and national economy. Therefore, the factors that investigate as main causes for present valuation system weakness this study validated that it have not structured institutional framework, standard requirement, professionals capability, contextual studied scientific system and advanced technological input these core caused to deprived the system practice. Consequence of the factors led for reasons of limited professional presence at right placement and lack of different relevant measurement of the property valuation accordingly. As reviewed on the above new constructed building, income generated, building age, high land value, present market and other intellectual properties should not assign a single valuation approaches. The valuation system must be change the working environment through developing its own contextualized and technological supported digital system.

Generally, overall the present limitation of property valuation have complicated and challenging to address with existed trend of the valuation standard and framework of the system. Overall, the derivations of the challenges were equivalent impact in most case to have high value difference in similar property under the consideration of the property condition, valuation system and practice required experienced professionals. However, it would great possibility to resolve in short time relative to the other countries experiences. While it properly and appropriately uses for the ongoing public and governments alerting situation about application of valuation system and it advantage. If considered accordingly the experiences of other counties gone through and used as reference to accomplish similar task. These well-educated and technological familiar professionals have been producing continually from higher institution play great role for advancing the system of modern property valuation practices.

4.4.2 Factors level of influence over similar property

4.4.2.1 Examination of attributes degree of influence

Building model and property value map of overall existed building property in the study area identify through it the distance from city center, distance from main road, distance to utility building function, physical attributes of building and others. These characteristics were main analytical factors to achieve the study objective through investigation, analysis, mapping and modelling the current value of property towards the appropriate property valuation context.

The degree of the factors severity to affecting the value of the property are representing in the survey was used for very high=1, high = 2 average = 3, lower = 4 and very low = 5 ways. The factor average influences over the property value have big pressure for devaluation of the value of the property. They used this Tick (✓) for ranking at each attributes below in *Table 4. 5*.

Table 4. 5: Property attributes 'degree of influence for valuation variation

No.	Attributes	1	2	3	4	5	Average (3= \bar{x})
1	Distance to city center	9	5	6	3	1	= 4
2	Distance to public utility	8	7	6	3	1	= 4.2
3	locational desirability	7	4	9	3	1	= 4
4	Transportation access	8	6	7	2	1	= 4.2
5	Market value of property	9	8	4	2	1	= 4.2
6	Property legal aspect	6	5	7	4	2	= 3.6
7	Building standard and regulation	6	3	7	5	3	= 3.2
8	Property Registration system	7	4	8	4	1	= 3.8
9	National market economy	4	5	6	6	3	= 3
10	Building conditions	8	6	6	3	1	= 4
	Frequency	72	53	73	35	15	$\sum \bar{x}/n = 3.778$

Source: (Key Informant, 2023)

4.4.2.2 Multiple linear Regression analysis

Based on the experts survey about the property factors degree affecting the practical valuation exercise responded in *Table 4. 5* above the property value shown as all these attributes have correlated as linear regression analyses below in *Table 4. 6*.

Table 4. 6: Correlation analysis of property attributes

Correlations										
Correlated attributes	1	2	3	4	5	6	7	8	9	10
1. Market value of property (MV)	1									
2. Distance to city center (DC)	.951	1								
3. Distance to public utility (PU)	.956	.956	1							
4. Locational desirability (LD)	.910	.941	.928	1						
5. Transportation access (TA)	.945	.971	.984	.937	1					
6. Property legal aspect (LA)	.918	.923	.920	.955	.922	1				
7. Building standard & regulation (BS)	.927	.931	.939	.936	.935	.953	1			
8. Property registration system (PR)	.911	.934	.924	.986	.932	.965	.938	1		
9. National market economy (ME)	.912	.934	.943	.920	.936	.931	.969	.920	1	
10. Building conditions (BC)	.938	.986	.972	.949	.986	.926	.931	.941	.929	1

** Correlation is significant at the 0.01 level (2-tailed).

The degree of influenced have used *Table 4. 6* above show the average output of the valid numbers (N) are 24 then from the maximum 1 for very high level of influence and minimum -5 to very low. This means that the degree of influence the attributes have higher effect grouped at first represented by “very high and vice versa.

The characteristics property from correlation relationship based on the survey conducted that the both these locational desirability with property registration system have 0.986 higher correlation shows strongest relationship then to the reverse the market value of property with locational desirability has 0.910 correlation of weakest relationship of the analysis *Table 4. 6* on the above.

This study survey investigates focused on the basic attributes that affects value property with integration of the facts, global trend and local context. These attributes are factors that affect the value of land and building property. These conducted on both the banks and municipality of the study area then the feedback over the factors affecting location value of building property analysis shown as the following results in *Table 4. 5* above the degree of influence over the property value feedbacks chosen more than average that described as big negative impact.

Table 4. 7: coefficient of correlation table of regression analysis

Coefficients ^a										
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations		
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
(Constant)	.117	.181		.643	.531	-.272	.506			
1. DC	.987	.343	1.061	2.881	.012	.252	1.722	.951	.610	.165
2. PU	.922	.351	.924	2.628	.020	.170	1.675	.956	.575	.150
3. LD	-.081	.359	-.084	-.226	.825	-.850	.688	.910	-.060	-.013
4. TA	-.065	.447	-.065	-.145	.887	-1.023	.893	.945	-.039	-.008
5. LA	.191	.228	.215	.838	.416	-.298	.681	.918	.219	.048
6. BS	.207	.240	.249	.863	.403	-.307	.721	.927	.225	.049
7. PR	.022	.362	.023	.060	.953	-.754	.797	.911	.016	.003
8. ME	-.342	.228	-.391	-1.497	.157	-.832	.148	.912	-.372	-.086
9. BC	-.906	.498	-.952	-1.820	.090	-1.974	.162	.938	-.437	-.104

a. Dependent Variable: Market value of property

Coefficient analysis that the critical value for confidence interval, confidence interval = 95.0%, Alpha, $\alpha = 0.05$,

Based on the above regression analysis the result indicated that the dependent variable the property value (Y) affected many factors of the property value at X degree and μ is the error due unexplained variables.

$$Y = \beta_0 + \beta_1(DC) + \beta_2(DU) + \beta_3(LD) + \beta_4(TA) + \beta_5(PL) + \beta_6(BS) + \beta_7(PR) + \beta_8(ME) + \beta_9(BC) + \epsilon;$$

The coefficient association among the variable $\beta_0 + \beta_1 + \beta_3 \dots \beta_n$ used to measure degree of sensitivity over the property value (Y) to unit change based on the attribute (X1, X2, X3 ...Xn) and the μ , it is terms of error variable in operates variation of model.

$$\text{Effect of the Estimated value (Y)} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \epsilon$$

Where: β_0 is constant and $\beta_1, \beta_2, \beta_3 \dots \beta_n$ are coefficients of property attributes,

X1, X2, X3 ... Xn are the attributes of property characteristics and “e” is the standard error.

$$Y = 0.117 + 0.987 (DC) + 0.922 (DU) - 0.081 (DL) - 0.065 (TA) + 0.191 (LA) + 0.207 (BS) + 0.022 (PR) - 0.342 (ME) - 0.906 (BC) + \epsilon$$

$$Y = \beta_0 + \sum \beta_i X_i + \epsilon$$

4.4.2.3 Emphasis the relationship property attributes and value

I. Hedonic Price Model Equation

The Hedonic Price Model; Y represents the actual price of a property, while \hat{Y} represents the predicted price based on the model.

Hedonic Price Model Equation;

$$e.i \text{ HPM} = \text{Constant} + f(\text{distance from the utility access} + \text{Distance to public utility} + \dots + \text{Error})$$

The Hedonic Price Model expressed as:

$$\hat{Y} = \beta_0 + \beta_1 \bar{x}_1 + \beta_2 \bar{x}_2 + \beta_3 \bar{x}_3 + \dots + \beta_i \bar{x}_i$$

In this context, the variables represent:

- \hat{Y} is Predicted property market value
- β_0 is Intercept term
- $\beta_1 + \beta_2, \dots, \beta_i$ are coefficients for each attribute
- $\bar{x}_1 + \bar{x}_2 \dots \bar{x}_i$ are property attributes (DC, PU, LD, etc.)
- ε is error term

Calculating Predicted Values (\hat{Y})

Using example coefficients for each attribute and the mean values of these attributes, possible to calculate \hat{Y} :

$$\hat{Y} = \beta_0 + \beta_1 \times \text{DC} + \beta_2 \times \text{PU} + \beta_3 \times \text{LD} + \beta_4 \times \text{TA} + \beta_5 \times \text{LA} + \beta_6 \times \text{BS} + \beta_7 \times \text{PR} + \beta_8 \times \text{ME} + \beta_9 \times \text{BC} + \varepsilon,$$

For illustration the following coefficients:

$\beta_0 = 0.117$ (intercept), $\beta_1 = 0.987$ (for DC), $\beta_2 = 0.922$ (for PU), $\beta_3 = -0.081$ (for LD), $\beta_4 = -0.065$ (for TA), $\beta_5 = 0.191$ (for LA), $\beta_6 = 0.207$ (for BS), $\beta_7 = 0.022$ (for PR), $\beta_8 = -0.342$ (for ME) and $\beta_9 = -0.906$ (for BC)

Interpretation: Y - The actual observed price of the property.

\hat{Y} - The predicted price based on the model's equation.

When we take the positive value of the coefficients (β), it indicates the direction and magnitude of the relationship between each characteristic and the property price. For example, if

$\beta_1 x_1 + \beta_2 x_2 \dots \beta_n x_n$ is positive, it means that an increase in $\bar{x}_1, \bar{x}_2 \dots \bar{x}_n$ (e.g., square footage) is associated with an increase in the property price. The analysis of the statistical regularities as stated by Belniak (2017) and more specific relationship between the price and features of the property, used to make a model based on this possible to estimate the price of the given property.

The coefficient the regression analysis was insignificant value of factors of over value analysis indicated in *Table 4. 7* above about the coefficients of attributes for analysis of the factors were insignificant because those p-value were lower than the given critical value ($p = 0.05$) with 95% confidence interval of the regression. Also, the factors with highly significance to the analysis should be ‘Sig’ < 0.05 , Based on the existing situation the attributes of the property results indicated that the distance to city center, distance to public utility, location desirability and national market economy were the most significant factors of the others. As *Table 4. 6* shows the attributes degree of impact over the property value variation that found significant based on the analysis were the distance to city center and distance to public utility are the most significant. The β -constant yield two conclusions due to reasons of the representation order of numeric value from the sever high up to last lower that the high value devaluation become under estimation value second. Therefore, these sources of devaluated outputs of appraisal value consequently effect for high value variation.

To this effect, it has two basic causes the policy and system based;

1. It has not scientific, uniform and standard procedure to exercise the required application of valuation system. The value of property reveals unexpected sale value (devaluation).
2. The difference among the official and actual sale records has incredibly varied millions. The official sale at last double time lower than the actual sale value.

II. Hedonic price modeling factors analysis

Table 4. 8: Coefficients of variable having significant value

Variables (property attributes)	β	Std. Errors	t (t-test)	Sig	Measuring units
Constant	0.117	0.181	0.643	0.531	--
Distance to city center	0.987	0.343	2.881	0.012	4 from 5
Distance to public utility	0.922	0.351	2.628	0.020	4.2 from 5
Property legal aspect	0.191	0.228	0.838	0.416	3.6 from 5
Building standard & regulation	0.207	0.240	0.863	0.403	3.2 from 5
Property registration system	0.022	0.362	0.060	0.953	3.8 from 5

The coefficient of these variables were significance over the property value as *Table 4. 8* above on the distance to public utility ($r = 0.987$, $p = 0.012$); Property legal aspects ($r = - 0.065$ $p = 0.887$); Property registration system ($r = 0.987$, $p = 0.953$). The shows that as increasing attribute value associated with increasing in results of dependent variable when the coefficient shifts towards positive value. This did not mean the negative coefficients have not effect but the

correlation have reverse trade-off direction. Even though, the analysis in *Table 4. 8* above of the positive attribute the most strongly associated relationship with property value are distance to city center and distance to public utility these have 0.012 and 0.020 sign respectively. This indicated that the significance level of each attribute in determining the price of the property (building property).

The final HPM of the study over the property value equals to the sum of β_0 and the coefficient of the times the p-value with less than 0.05. As p-value become smaller, the relationships of the dependent variables and independent variables have been stronger correlation.

For more information of the attribute look above in *Table 4. 8* the β_0 is the constant that whereas the coefficient of the $\beta_{ij} = 1, 2, 3 \dots n$ are the degree of sensitivity dependent variable (\hat{Y}) to change the predictor the property attributes ($X_1, X_2, X_3 \dots X_n$).

$$\hat{Y} = 0.117 + 0.987 (DC) + 0.922 (PU) + 0.191 (LA) + 0.207 (BS) + 0.022 (PR)$$

The measurement unites considered the impact difference when the 24 respondents rate five have mean value of 4.8 ~ approx.5 comparably with the mean value of each attribute greater than the average rank (3) in the survey result in table above considered the model to indicate the attribute degree of influence according to the feedback. This sum of responses rate is greater or lesser than average (3) divided by five (5) or full distribution of the feedback about variables. This answers that if the average of the total 5 level ranking (very low, low, average, high and very high) have 4.8 ~ 5 and how much is from the average (3), high (2) and very high (1).

Calculation based on the following step:

Let us calculate \hat{Y} use mean value of respondents feedback on attributes degree of influence over the property value answered \geq average value.

DC=4, PU = 4.2, LD = 4, TA = 4.2, LA =3.6, BS = 3.2, PR = 3.8, ME = 3 and BC = 4 are the mean value of the attributes feedback ranked above average.

$$\hat{Y} = \beta_0 + (0.987 \times 4) + (0.922 \times 4.2) - (0.081 \times 4) - (0.065 \times 4.2) + (0.191 \times 3.6) + (0.207 \times 3.2) + (0.022 \times 3.8) - (0.342 \times 3) - (0.906 \times 4),$$

$$\hat{Y} = 0.117 + (3.948) + (3.8724) - (0.324) - (0.273) + (0.6876) + (0.6624) + (0.0836) - (1.026) - (3.624)$$

$$\hat{Y} = 0.117 + 4.0067$$

$$\hat{Y} = \underline{4.1237}$$

To summarize the outputs $\hat{Y} = 3.9396$ suggests that the coefficients predicted the based on the scale of the attributes ranking while the coefficient for balancing the attributes impact over the appraising value property.

Interpretation;

The positive coefficients (b) indicate that an increase in the corresponding variable leads to an increase in property value. For example, distance to city center (DC) was the higher coefficient of 0.987 means the properties closed downtown has more valuable. This result illustrates to qualify the attributes degree of influence over the value of every property depends on variables stage of relevance and accurate measurement. Let us say at the center points where all variables=0, we have to add the 0.117 which is value of β_0 .

Example: the actual transaction representations, with a model predicting house prices based on distance to city center (\bar{x}_1), building standard (\bar{x}_2), and building aesthetic rank (\bar{x}_3) and the constant or price benchmark of properties (β_0).

$$\hat{Y} = 50000 \text{ Birr} + 100 \bar{x}_1 + 20000 \bar{x}_2 - 5000 \bar{x}_3$$

Using the $\beta_0 = 50000$; the mean values ($\bar{x}_1 = 10 \text{ km}$, $\bar{x}_2 = 200 \text{ location value}$, $\bar{x}_3 = 5 \text{ level}$ and

$$\hat{Y} = 50,000 - 1000 (10) + 2,000 (200) + 5,000 (5)$$

$$\hat{Y} = 50,000 - 10,000 + 400,000 + 25,000$$

$$\hat{Y} = \underline{475,000}$$

This means a house with average characteristics predicted the cost of 475,000 Birr.

Interpretation of Coefficients' Signs;

The coefficients (β) in a regression model indicate the direction and magnitude of the relationship between each independent variable (X) and the dependent variable (Y). The signs of these coefficients are significant:

❖ Positive Coefficient ($\beta > 0$)

- ✓ Direct Relationship: A positive coefficient indicates a direct relationship between the independent variable and the dependent variable.
- ✓ Interpretation: As the value of the independent variable increases, the predicted value of the dependent variable also increases, holding other factors constant.

Example: If $\beta_1 = 0.987$ for distance to city center (DC), it means that for every additional mile closer to the city center, the property value increases by 0.987 units

❖ Negative Coefficient ($\beta < 0$)

- ✓ Inverse Relationship: A negative coefficient indicates an inverse relationship between the independent variable and the dependent variable.
- ✓ Interpretation: As the value of the independent variable increases, the predicted value of the dependent variable decreases, holding other factors constant.

Example: If $\beta_3 = -0.081$ for locational desirability (LD), it means that for every unit increase in locational desirability, the property value decreases by 0.081 units.

❖ Practical Implications in Hedonic Price Model Quantifying Influences:

- i. The coefficients (both positive and negative) quantify the specific impact of each property attribute on the overall property value, leading to a more precise valuation.
- ii. Understanding Trade-offs: Positive and negative signs help in understanding the trade-offs between different attributes. For instance, being closer to the city center may increase value, while poor building conditions may decrease it.
- iii. Equitable Valuation: By considering both positive and negative impacts, the model ensures fair and balanced valuations, addressing high value variations in similar properties.

4.4.2.4 Model effectiveness

The Hedonic Price Model (HPM) is particularly effective in addressing high value variations in similar properties by providing a structured and systematic approach to property valuation. It captures the influence of various attributes on property values, ensuring a comprehensive and fair valuation framework. By considering coefficients and variables for all relevant attributes, the model offers a holistic understanding of property value determinants. Qualitative analysis underscores the importance of these attributes, highlighting the model's utility in real estate valuation. According to sources, the HPM accounts for multiple attributes, maintains objectivity and consistency, provides detailed analysis of influences, and handles multi-collinearity. This ensures equitable valuations for similar properties, reducing discrepancies and valuing comparable features similarly. Thus, the HPM serves as a robust tool to tackle high value variations, benefiting transactions and creating a more by Copilot (2024) transparent and equitable real estate markets. This study used the HPM to show the magnitude of value variations in similar properties and to predict the degree of influence of various factors on property value appraisal. However, in developing countries like Ethiopia and other African

nations, the property valuation system and administration are still in the early stages of growth. The study highlights the importance of identifying property characteristics to understand their influence on value changes. Existing valuation practices often overlook these details. Factors affecting property value *Table 4. 5* above addressed before advancing from traditional to modern valuation methods. Unfortunately, scientific methods not yet fully implemented, and the current valuation system remains traditional.

4.4.3 Tendencies and challenges of property valuation

4.4.3.1 Possible mechanisms to reduce defects of existing system

According to the discussion feedback from key informants in targeted sectors, the property valuation industry is making progressive advancements by recognizing global research and innovative technologies, leading to a radical shift in system roles. Sector key informants highlight the importance of property valuation for both governmental and private socio-economic development, with 97% of respondents aware and 97.23% actively practicing property valuation. However, current standards and regulatory systems lack detailed legal and scientific content, requiring urgent solutions to address the complex nature of property valuation.

For example, the Hadinet Municipality's property valuation manual suggests building value should consider design and market appraised volumes, but practical application often neglects these guidelines. Market investigations face challenges due to multiple factors and a lack of digital systems, resulting in delayed data updates and inconsistencies. The field area has occupied by similar professionals lacking in-depth understanding of property valuation practice and its impact leading to multidimensional societal burdens.

Research findings indicate that existing practices fail to consider various methods, purposes, and techniques. Despite some community and broker preferences for scientific valuation, most lack knowledge of modern systems. GIS technology recommended for practical skills and conceptual knowledge, addressing theoretical, mathematical, and legitimacy aspects of property valuation. The study uses spatial analysis and hedonic price modeling to align the findings with global and local trends into community and property brokers, banks, and property administration offices.

improvement. Experts revealed that informal practices and lack of a regulatory system often result in overlooked market values. Property valuation influenced by factors like location, culture, religion, and valuation purpose, which vary based on the property's intended use and the country's development stage. Brokers play a significant role despite their lack of valuation skills, and they suggest advancing the system legally and digitally.

Experts and managers from sectors like MHSC, Banks, MMCA & RLRAIB, and Brokers FGD recommend several improvements. First, involving well-trained professional experts to apply their full knowledge, skills, and experience using effective methodologies is essential. Second, increasing public awareness about the socio-economic, political, environmental, cultural, and historical impacts of property valuation is crucial. Third, establishing a legal framework to control and manage property valuation is necessary, requiring specific manuals, standards, methods, and regular updates.

Technological advancements are also important, including high-capacity databases, secure server systems, surveying instruments, and software tools like GIS and QGIS. Additionally, the current reliance on cost approaches is insufficient, as these mostly applied by civil engineers who lack proper valuation training. The income approach used but not effectively practiced. Integrating spatial and non-spatial data with geospatial tools can help address valuation contradictions.

Specifically, the MHSC highlighted the need for standardizing and zoning land for compensation purposes and the use of both income and cost approaches depending on the valuation assignment. However, civil engineers primarily use the cost approach, leading to inaccurate valuations. The regulatory system fails to account for location value, often resulting in similar properties in different towns being appraised the same.

Moreover, experts emphasize the necessity of a uniform, well-organized, and justifiable property valuation system. Challenges include inadequate professional capacity, lack of historical data, and reliance on broker-derived benchmarks. Finally, the interviews with Tigray Investment Bureau officials indicated that property transactions often influenced by owner agreements, with little intervention from offices. This underscores the need for professional Valuers and a systematic approach to property valuation.

4.5 Specify sale value of building with high variation using GIS application

This section of the study explained that the role of geospatial techniques for property valuation and administration purposes. The application of this techniques make unique in this discipline has very energetic tool to integrate the spatial and non-spatial data in synergized approach with tables, map and images.

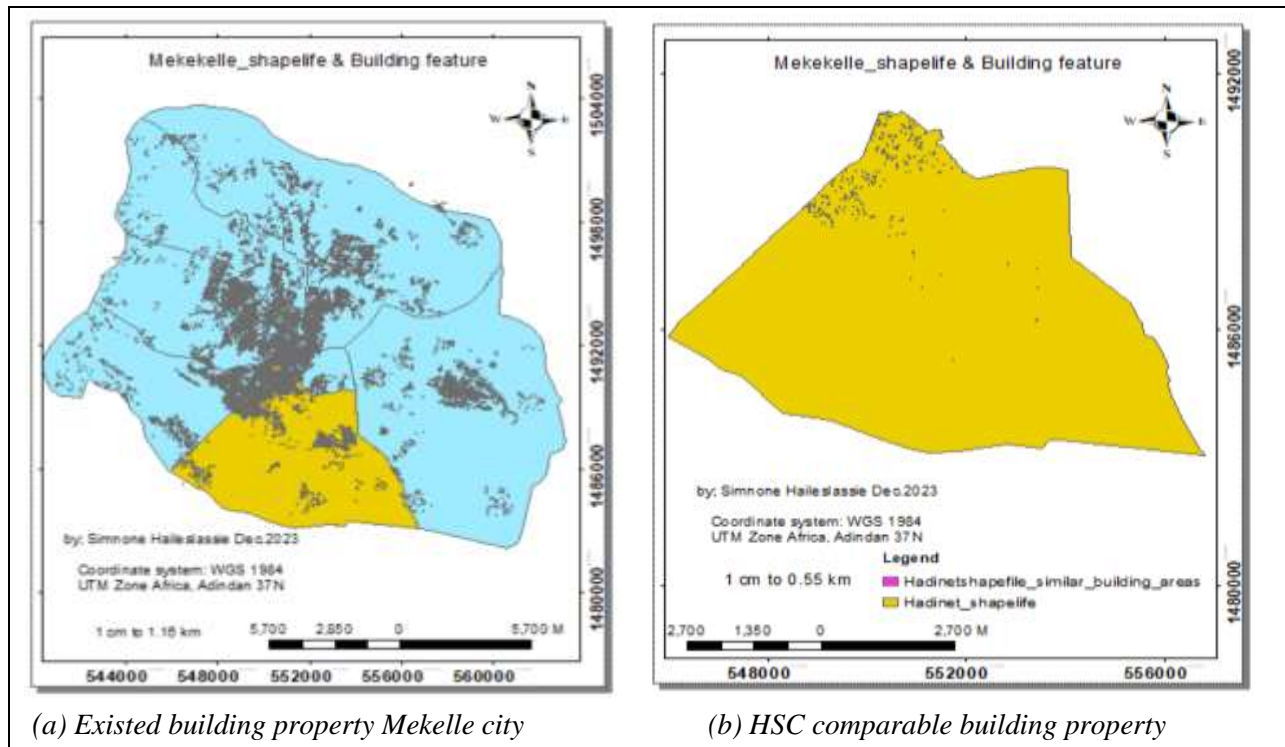


Figure4. 11: Existing building property of the Mekelle city and Hadinet sub city

Figure4. 11 (a) in Mekelle city Shapefile of existed building property and then Figure4. 11 (b) shown the Hadinet sub city comparable building property. Property valuation practice is understating of nature and amount of existed property is mandatory. Because, the detail description and attributes of the property is important role for estimate the present value. Therefore, these maps portrayed the difference among the overall existing and existing transaction made building property. Inventory data of Hadinet municipality indications from existing building property 6.9% (approximately 7%) of these have conducted property valuation transaction.

Up on different stockholders support and lot of techniques the depicted maps have produced for interrelated task purpose of this research. It could done, through collection of secondary data,

experts showcase, and some owners direct contacts. Generally, it have accomplished with great successful after very difficult and learnable progress.

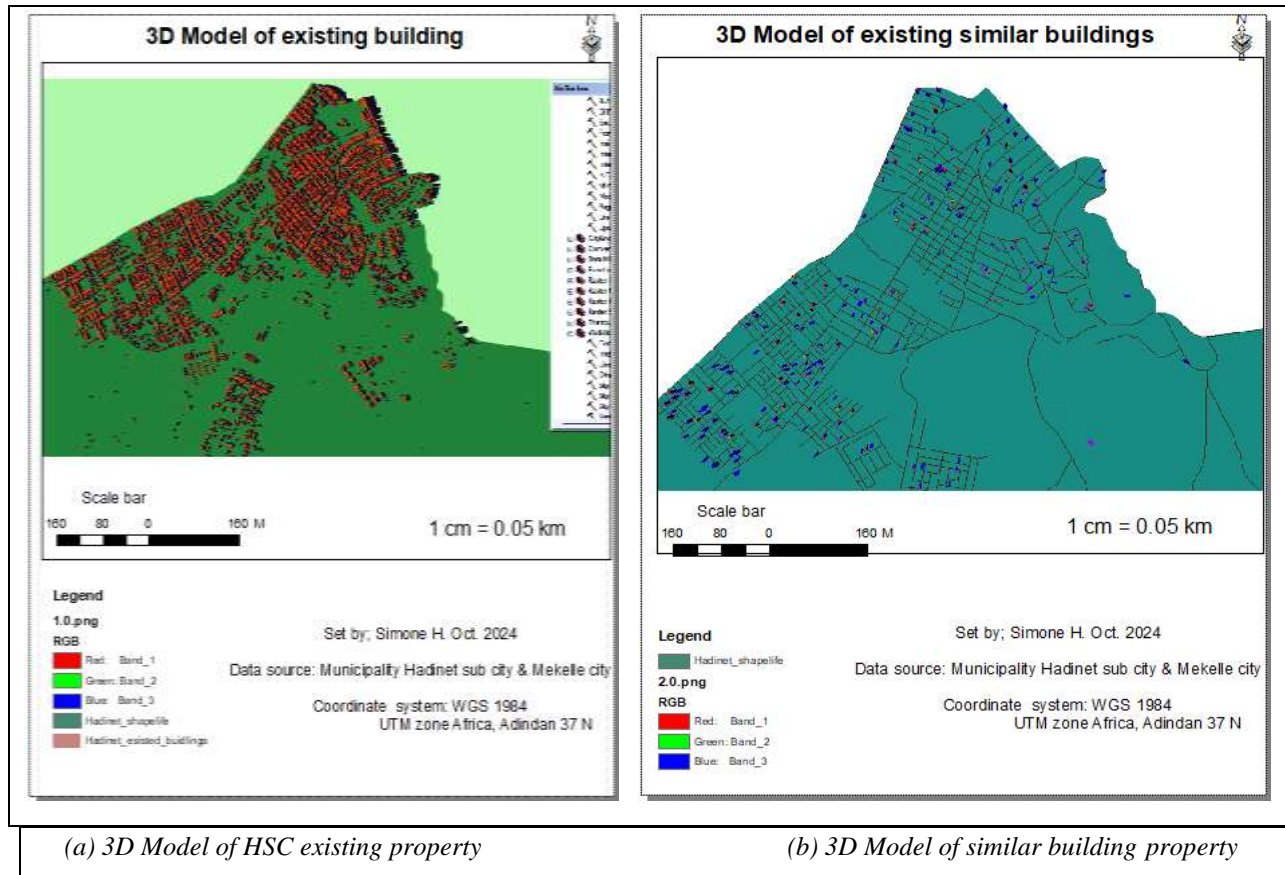


Figure4.12: 3D Model of existing property in study area

This map, Figure4.12 (a) shown as the 3D Model of the real existed building property in the study area. The next map Figure4.12 (b) shows the existed property in the study area that has comparably similar building property. The different colors of the separated building layout indicated that the significant value variation and similarity of property.

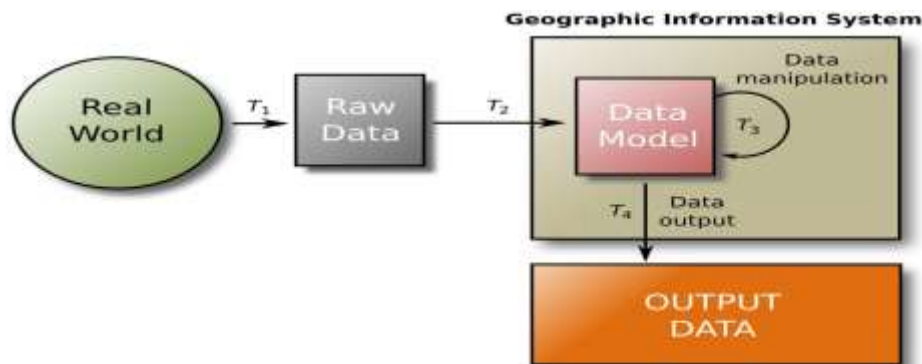


Figure 4.13: GIS data processing diagram

4.5.1 GIS Layers of the Property Valuation Analysis Process

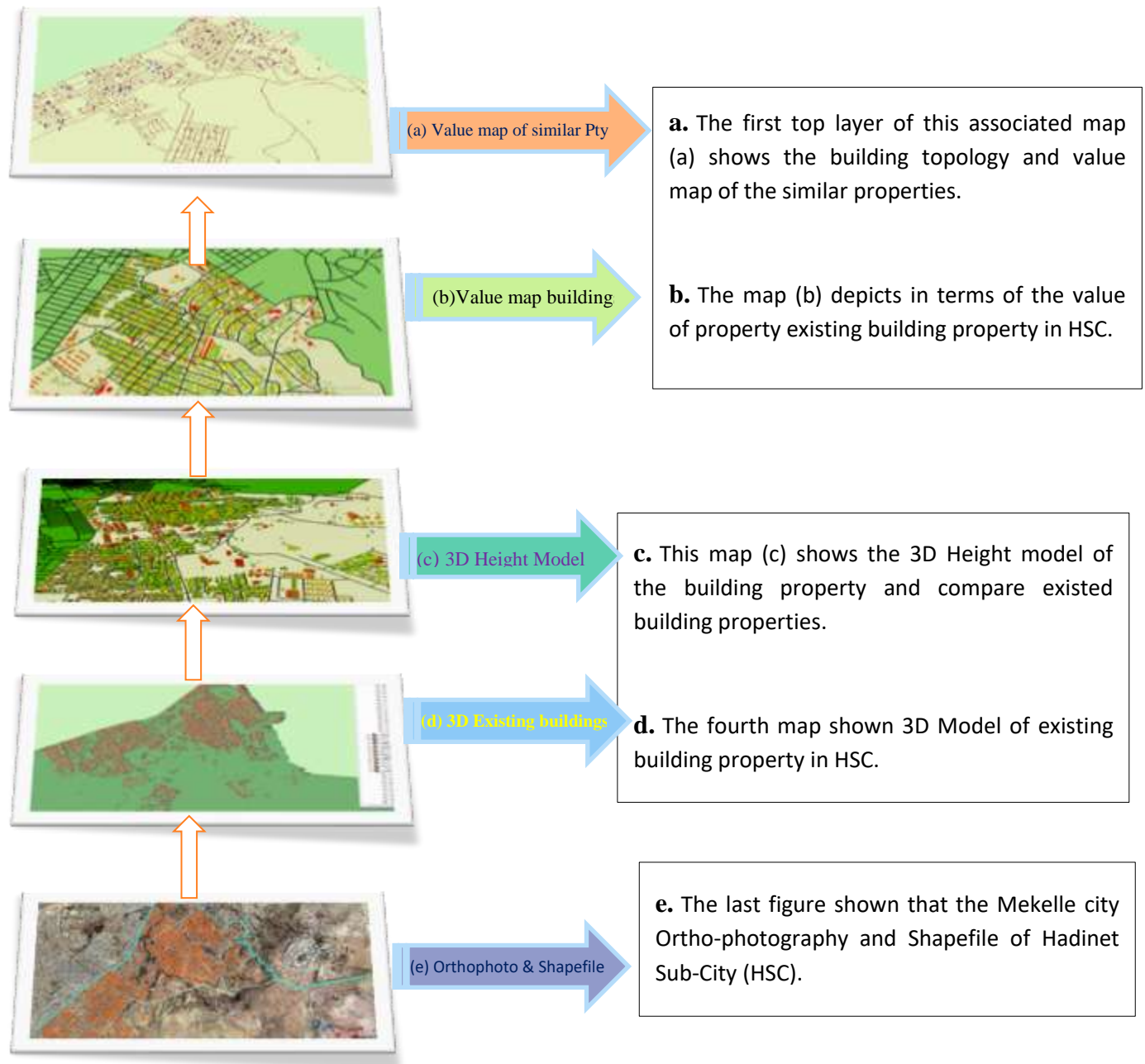


Figure4.14: Layers of the property map analysis

The map layer depicts the structural process of identifying the appropriate building property from the study area at same time the tabular data entity of the building property variable. Finally, this conducted to show the spatial difference of the buildings and the value difference of the property concurrently.

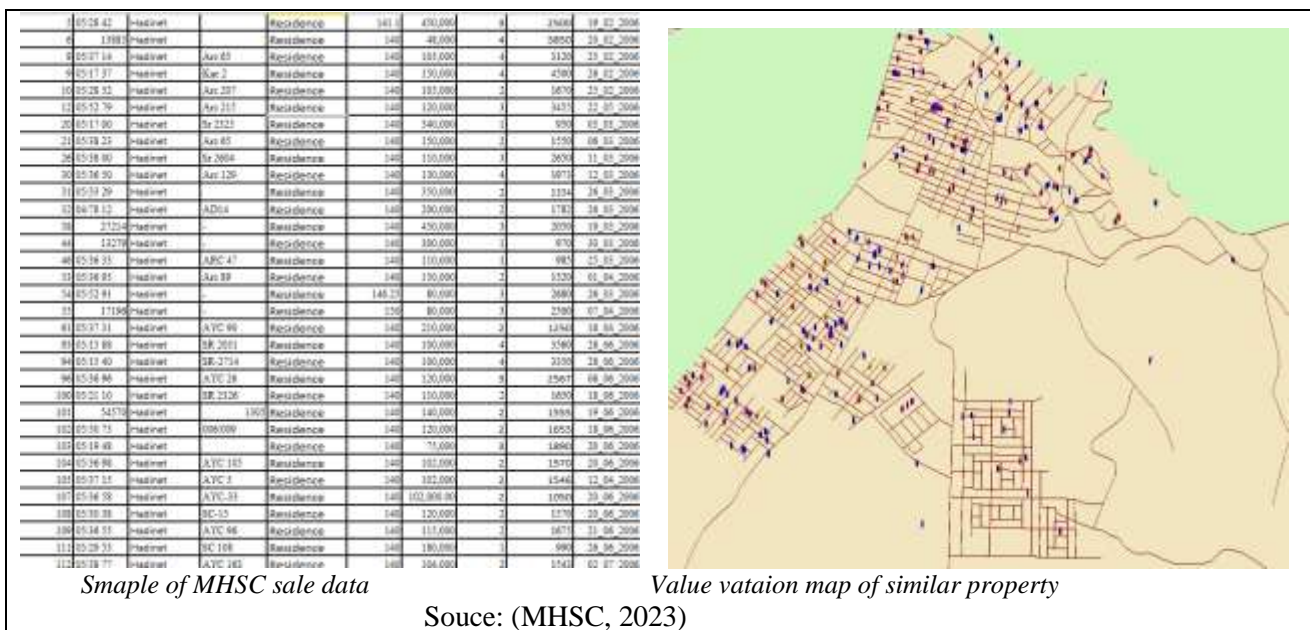


Figure4.15: Map value building property and attributes value

The building property have considered many difference entities such as quality of construction material, level of construction, sale period , value addition inputs (greenery, fence, design etc), location etc. Indeed, these points are conceptual and basic for differentiating value of property. However, the high property value variation as the listed below in *A2 Table 3* that took in to account the factors that affect the property value but the difference one building to other building property's biggest percent taken by the land value of property.

Example: the property in *A2 Table 2* below have priced started from 4 million to 9.3 million. The locational zone of the property has either same in zone-1-1 and zone -2 - 2 or zone 1 and 2. Even though, the property value has mainly not varied due to deductive factors defined formerly. To the reverses, the lack of effective system, institutional framework, professional experience and technological supports. Therefore, more than 65% of the values difference became through high devaluation appraisal process and system of land value and the left 35% of value difference in similar property arose from building devaluation and formally value adding attributes. Still in the real valuation practice, the value adding material and small factors have not considered that much in some cases. Not only this but also, the location value and zoning system have compromised as the same time as real practice interview reviewed in Case Study – C indicted.

The sale price of properties shows in *Figure4.16*, collected from exited document of the private contractual agreement of that the two parties (seller and buyer) agreed by their sign. The result of

the data indicated that the average different for 140 m² with in same location considered the value under the equivalency each property. The sale value of this building property investigated 800,000 birr of the smallest to 9,300,000 birr to the highest sale price difference. The property has same building and similar zone but that sold with extremely different sale price. This indication has perceived how much the applying system valuation in very poor approaches.

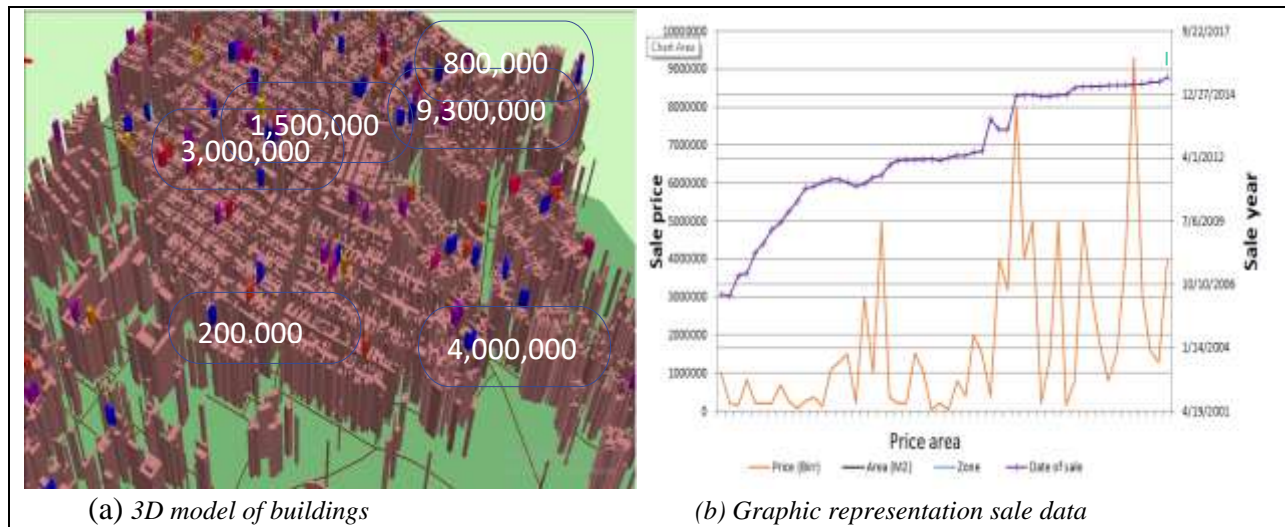


Figure 4.16: 3D Map and graphic label of the sale data representation

Unlike the other target groups in most, the high value variation incidence of building property has not working for property valuation system of bank institutions. Because, they institution have applying their own valuation procedure make beneficiary their bank. Not only this but also, one very an expected techniques that extremely drawback the banks valuation system made unsuitable was the framework that used to estimates the building value haven't considered the location value of land during appraisal of property.

The devaluation of this value appraisal has many negative impacts. These impacts may vary it affecting degrees influence. Whereas, overall the impact tend to violation social society, reduce individuals benefits form their property, neglect justice equity, depreciated national economy, disturb market stability, lost transaction certainty and create opportunity for illegal brokers, etc.

Therefore, the study shows directly shown and as observe in the in Figure 4.17. The property valuation have not uniform and scientifically frameworks procedure and institutions.

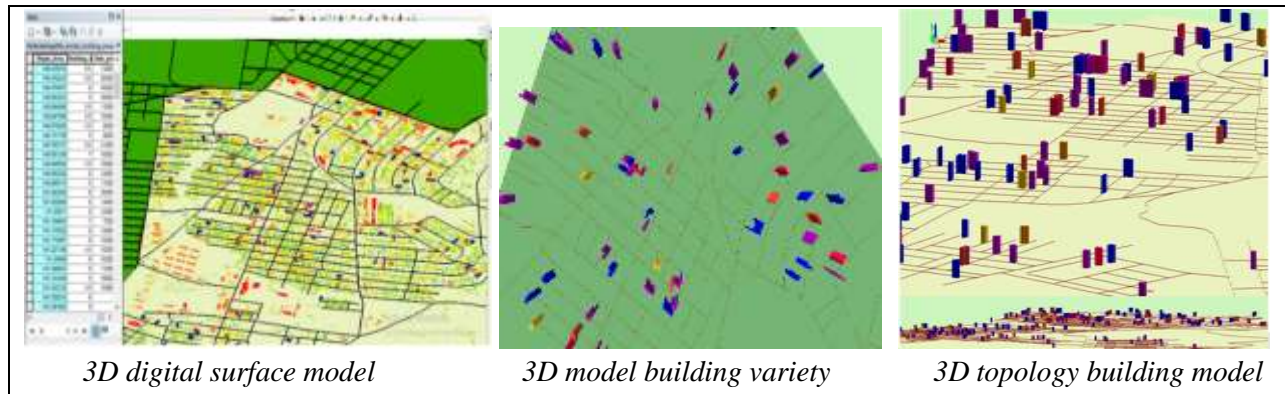


Figure4.17: Location identifying of building similar property and location

The existed sale property with parcel area of 138 – 152 m² with existed building model of the study area that indicates the similarity among its size, function, zone and building differentiate by 3D map representation model. The color from bold red to bold green sequence shows the building height. The bold blue, blackish red and bold purple color shows the buildings property with similar building value at similar property characteristics.

The map of building properties appeared with same tone color shows similar building characteristics and locational topology. There is one basic concern of this research study that have the high sale price building property which sourced due to absence of standardized legal , uniform and studied system of valuation.

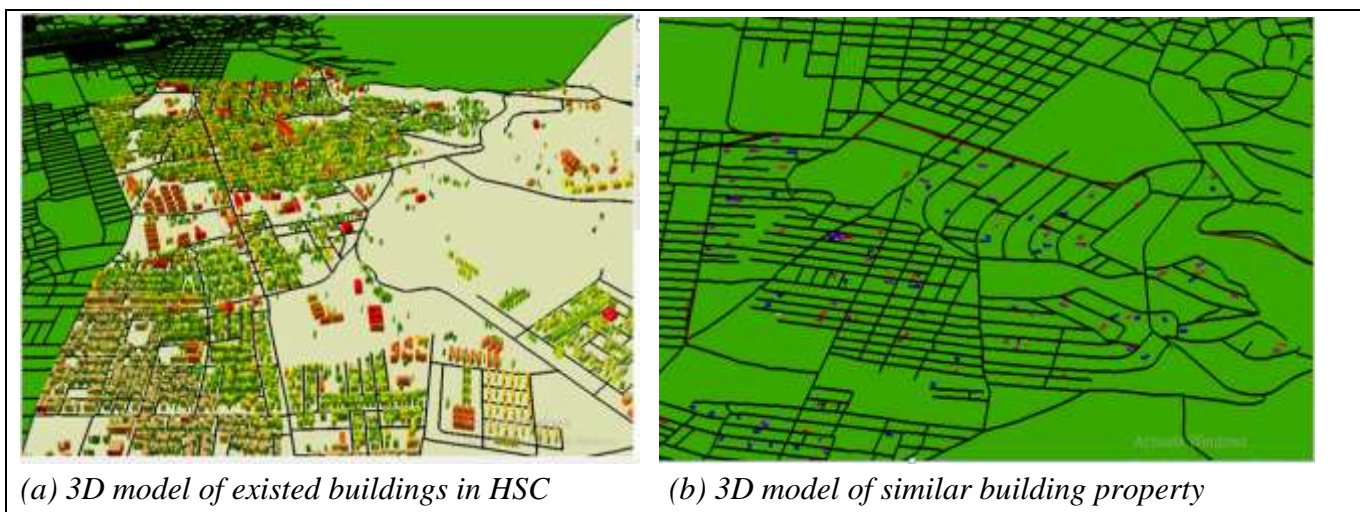
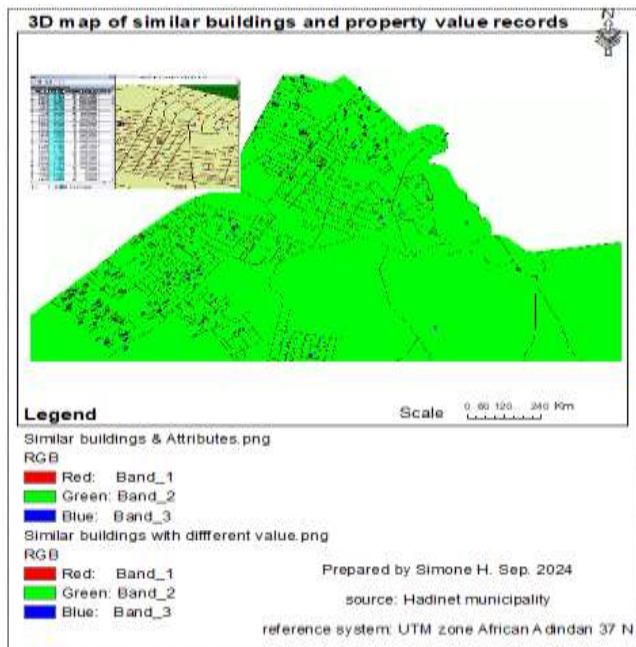


Figure4.18: Building hight and HSC extrude using urban deve't & housing data

The basic concern that discussed broadly here was the investigation of the property location to and date of the transaction. It has successfully accomplished with great technical and analytical processes of field investigation and offices expert delegated efforts.

The *Figure4.18* (a) above represents the target group or built up property (buildings) height and road network that play great role to define property values. Because, the building physical and non-physical attributes of the building property factors has primary influenced variable patterns.

Figure4.18 (a) above shows the building height with multitude story and rooms. Also the *Figure4.18* (b) indicated the value map of building property with different property attributes and location-location value descriptions.



Map value of property defined through hedonic Price model of the characteristic of property factors on the above *Figure4.19*. The main road that divides the building properties section that helps defines the characteristics of the attributes the property analyzed by this 3D model. The map value of sale property with the significance of the price values through hedonic price model. The variable numbers of the hedonic price model generates using the linear regression analysis of the spatial characteristics of the building property. This attributes analysis led to quantify the price value of the building.

Figure4.19: Value map of similar building property with high value variation

The above *Figure4.19* shows building model and property value map of overall existed building property in the study area. It identifies through it the distinct from city center, distance from main road, distance to utility building function, physical attributes of building and others. These characteristics were main analytical factors to achieve the study objective through investigation, analysis, mapping and modelling the current value of property towards the appropriate property valuation context look *App-A 1– A: maps* (Figures g & h) for details.

Based on map (as seen in *Figure4.17*) above the building property appeared with same tone color on the map show similar building property and the locational topology. There is one basic

concern of this research study that have the high sale price building property which sourced due to absence of standardized legal , uniform and studied system of valuation. The standard and regulation that has a mandate for setting the framework and implementation progress of the property value were not any map description

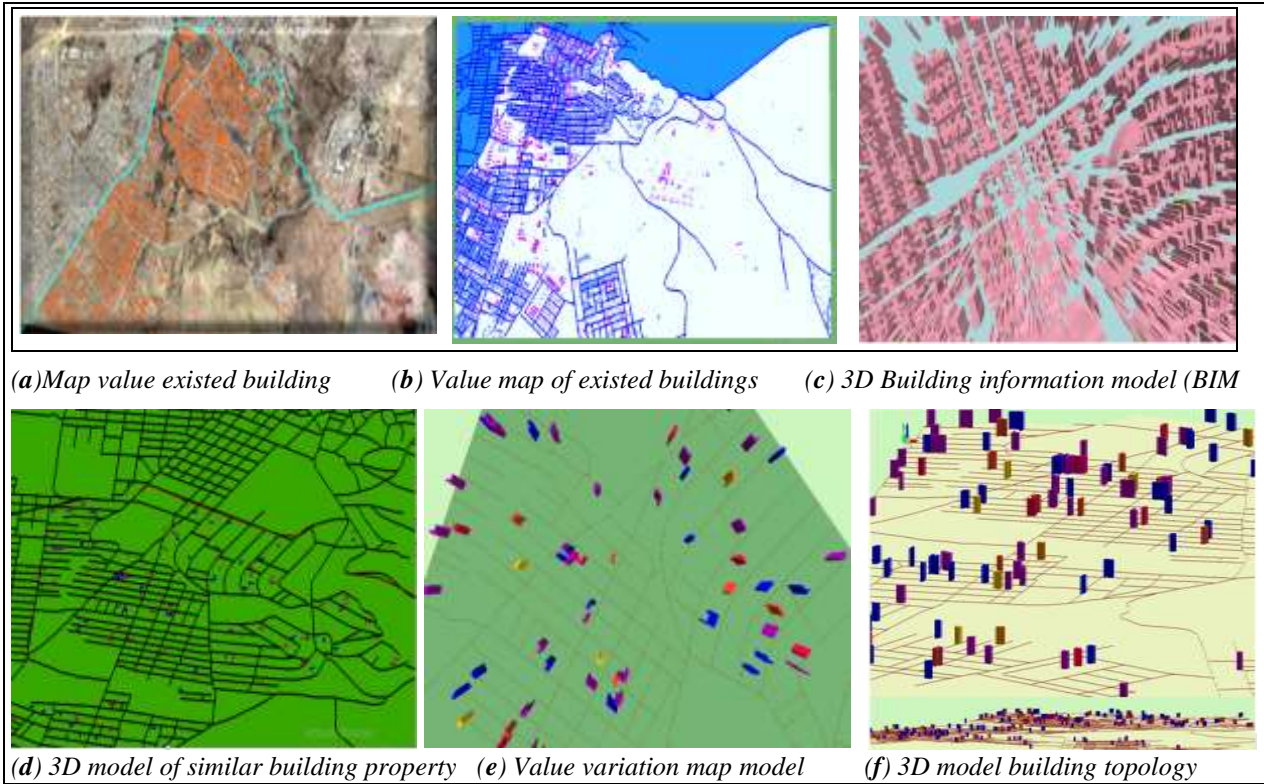


Figure4.20: 3D map of all existing and similar building property

4.6 Summary result of study finding

Table 4. 9 Summary table of the study finding

S/no	Base points	RIPT (97)	MHSC (30)	Banks (40)	MMCA & RLRAIB (23)	Brokers (9)
1	Understanding of property valuation (PV)	98%	97%	98%	100%	100%
2	Have you made/applied PV?	82%,	80%	93%	78%	33%
3	Your appraised building types	80% residential	---	---	---	---
3	The valuation purposes	61%-Tax	40% Comp. and 37%-Tax	67% Collateral	35% Collateral & 26% Tax	67% rent & 23% sale
4	Expert service delivery and degree of satisfaction	36% served, 98% >=average	---	--	---	---
5	How appraise the remaining 64%?	55% owners 25% both parts	---	---	---	---
6	Valuation methods	---	23% scientific	60 scientific	13 Scientific	0% (none)
7	Valuation approaches	---	60% Cost app	57% Cost app	65% Cost app	0% (none)
8	High value variation in similar property	56%	97%	*26%	52%	89%
9	General price difference > 10,000s'	90%	63%	85%	42%	100%
10	Residents readiness to use new system	67% demanded	---	---	---	---
11	System expect to solve	63% unfair value, 20% MV	---	---	---	---
12	Expectation from advance system	67% Fair, 33% high value	---	---	---	---
13	Major causes for high value variation of similar property (undefined property Quality, size, location, value & type)	---	73 % all factors, 27% more location	95% all factors, 5% more location	All factors with more impact in value & not type	100% all factors, w value & types
14	Considerable variables during appraisal (location, quality, area & age)	---	67% all, more Location & quality	*93% quality & 7 % area	Considerable, 35% more location & legal case	Considerable, 45% more location & legal case
15	Forwarded set of solutions used the system, professional, institution, policy and technology as bases	---	67% Technology, 23% institution and 10% suitable system	All affected, 52%Technology & others like awareness	All, more 39% technology & 35% institution	All and others like illegal brokers

Source: (Key informant, 2023) and (Survey, 2023)

Chapter - Five

5. Conclusion and recommendations

5.1 Conclusion

The finding results of this study *Table 4. 9* above summary results indicated that 99% questionnaire survey and interview key informants have knowhow about the property valuation disregards of the professional detail, method and standard requirement of valuation. Then, 82% of the residents' respondents, 33% brokers and 84% of average of the 95 selected sectors key informant are thespians of the valuation system in one to the other as client or service providers. Similarly, the purpose of the property valuation in RIPT shows 61% used during taxation. Whereas, sectors conducted that depends on the task priorities; as sectors survey result shows in MHSC from 32 key informants about 37% for taxation and 40% for compensation. From 40 key informants' of the Banks about 62% of the valuation purpose done for collateral related. These 23 key informants of regional city key informants from MMCA & RLRAIB shown the valuation conducted about 37% for collateral and 26% from taxation purposes. The 33% of the total broker informants have used valuation from thus 23% for sale and 67% for rent purpose regardless of the method and requirements of the valuation standards. The summary results implied that valuation practice for sale purpose applied all the target groups with frequency of difference for one sector to other. Most of the results of the practices for rent purpose show on the brokers' daily massive activity. Moreover, their role in sale property has not undermined.

According to the result of this study, the present valuation system the trend of developmental practices in each selected sectors shows 23% MHSC, 60% Banks, and 13% MMCA & RLRAIB practice of the scientific methods depicted regardless of the detail global standard. The remaining percentage feedbacks were traditional and mixed; which means that both are not effective for valuation practice. It has some variation from sector to sector due to the nature of the valuation purpose enforced varies to select best methods. Whereas, the general practice the valuation system shows 60% of the MHSC valuation purpose, all the banks used 57% cost approach except w two banks have partially used income approaches. Similarly 65% MMCA & RLRAIB used the cost approach preferably used in city and regional level. The property brokers have not any contribution in the standardized method and approach to apply; they only have value the property

by default through customary way according to the wind direction blows. This shows, the sale comparison approach has completely ignored in all valuation practice of these sectors indicate the sale comparison or market approach of the property valuation found out-of-service, which is recommendable for residential and real estate buildings. At the same time, the survey results shown that 80% the function (type) building property passed under the transaction was residential houses. To conduct these made buildings valuation using 61% cost approach, 13% income approach and 24% mixed of both valuation approaches in sectors average results. However, as reviews like IAAO (2021) proven that the science of property valuation, the professional requirement and international standard highly recommend sale comparison approaches for residential. Whereas the valuation book by David Isaac (2002) reinforced the other approaches of valuation are important but reliance of a single, approaches have leads to devaluation of the property's value at the same time selection of appropriate valuation method and approaches is responsibility of Valuers. Accordingly, the study findings shown that the property valuation have not conducting appropriately in almost all practices except the some application of cost approach part for newly built and under construction building property value has important, not appropriate for other.

The finding results of the study (as seen in *Table 4.9*) above 53% of the whole study contributors (residents, experts and officials respondents) only agreed with the high value variation. This is the sum average result of 56% RIPT, 97% MHSC, 26% Banks, 52% MMCA and RLRAIB and 89%. Property brokers have responded in average accordingly. Whereas respondents feedback about the general price differences were 29.2% in 1,000,000s' not included the MMCA and RLRAIB, 24.4 % in 1, 00,000s', 22.4 % in 10,000s, 1% in 1000s' and 22% less than 1,000s' estimated price difference have suggested to in each sales. Overall, 40% of the difference with response rate of 37% MHSC and 58% MMCA and RLRAIB were below 10,000s' general price difference of similar property sales data, whereas the remaining 60% have from 100,000s' to 1,000,000 of sales differences. Similarly, 76% average result of the finding result shows from 10,000s'to 1000,000 price differences.

In both the consecutive concept of value variation and general price, difference shown inconvenience over respondents' feedback and the response rates well. The questioner survey conducted above 85% wherein specific place of thespians found like justice and private consultancy office to make contractual agreement about the property transaction, however, 44%

of them have said not transacted and none information, but they were about the property transaction during the interview period. Therefore, as further investigations had made to reconcile the gap among the responded feedback using FGD and panel discussion with selected individuals identified bold reason behind the reality with some of the respondents not agreed in value variation of similar property. Based on the RITP feedbacks about general price differences shown 90% of them responded the price have been above 10,000 differences. In addition, discussion with selected individuals shows those residents who sold property respondents. Residents' respondents, especially almost 80% of the owners want to secure their transaction information because the real sales information and officially registered data have completely varied. This mean the property exact sales price was too high and the officially registered was very small. Besides to above the sources the system drawback, policy framework and limitation professional support have also therein. On the other hand, the bank key informants have denied real practices that they have sufficient evidence about the value variation but to keep their institutional privacy. The banks used for collateral purpose of mortgages, loans and foreclosures. Thus, purpose of valuation guidance considered first the advantage of banks' risk as guarantee. To contrary, even the financial institution have not applied uniform property value framework and the bank experts have enough information on value difference over similar building property but as primary focus of the banks are the business; the confidentiality and manuals working frame concerned and influenced their freedom to feedback.

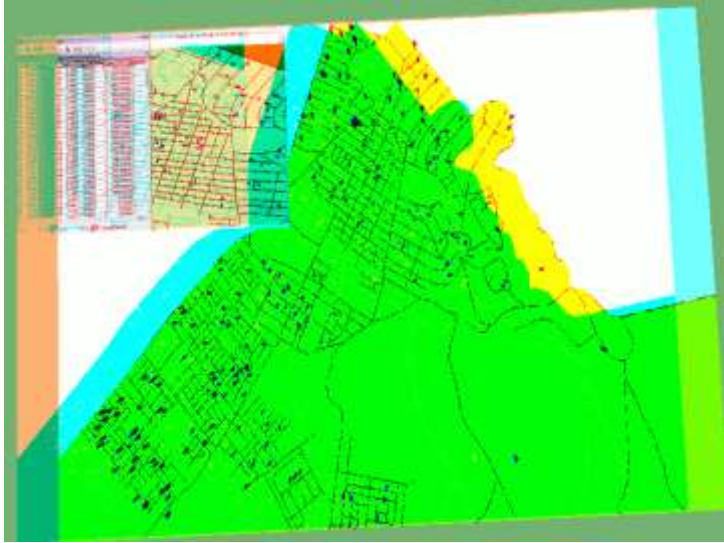
Afterward the 36% of the residents got experts support during their transaction but 98% of below average and 71% below low degree satisfaction. As a result, of the above limitation of property valuation practice, the property owners' pressure over the sale value decision and the banks considerable goals of valuation practice caused for high value variations of similar properties.

The major factors challenge for valuation practice mentioned by MHSC and Banks key informant 100% the absence of defined location, quality, area, value, type, and these and other factors, specially the undefined location have great negative impact to identify the property exact places. Whereas the all factors accept the type, have impact for the existing valuation practice MMCA and RLRAIB and Property brokers. To the reverse, the undefined value of property has 39% MMCA and RLRAIB but not the brokers. The broker have not much concerned about the definition of property value during the transaction periods rather than promoting for better commission. Overall, these inconvenience and big difference between both sectors of key

informant over the property valuation practices. The same way, the expert key informants findings about the consideration of variables like location, quality, area, age of building and others during their practices the shows; MHSC considered 100% all factors, specially absence of defied location and quality of property, banks considered as a challenge 100% in both quality 93% and area 7%, the most considerable variables. Whereas, the RLRAIB and brokers have 100% considered all variables including other legality cases and both have highly considered the location that these variables mostly considered during these sectors valuation practice.

As the RIPT (community) points of view the 97 total survey respondents 55% fairness, 20% transparency, 20% professional and 5% the system were the affected for the dissatisfaction of the service provision. When, these roots causes have solved that these 67% fair value and 33% high value of property transaction expected to have in the future. The brighten point here have 67% of the community shown readiness to advanced valuation system that considered as brighten opportunity for massive public acceptance and to improve soon. From the coming technological valuation practice above 80%, the majority of RIPT would like to have fair and market value of their properties. Conveniently, the experts key informant suggested to with average rate of responded that 16% suitable system, 13% professional capacity, 21% institutional framework, 11% valuation policy, 45% technological input and 5% others of the practices challenged to advance the valuation system. All sectors key informant except, Hadinet municipality have not reflected on both the professional capacity and policy of property valuation and the RLRAIB and brokers have define further points like public awareness and controlling illegal brokers have vital role for enhancement of the property valuation practice.

According to the findings result of the study the technological inputs have significant role for advancing the valuation system through conducting accurate and fair valuation practice from the very beginning to the final valuation reports. For that matter, the integrated application of advanced geospatial tool and property model as shown in *Figure 5.1* below applied to capture, store, manipulate and display the spatial and non-spatial data. HPM, which used as advanced analysis modeling helps to examine characteristics of property attributes' to accentuate the relationship. The statistical application of multiple linear regression analysis applied for HPM that played significant role to emphasis the property variables' characteristic and degree of influence over the value of property (as seen in *Table 4. 5*) above.



The map model in *Figure5.1* above indicated that the benefits of the digitally registered and mapped layers of the different real property spatial and tabular data for multipurpose system. Mainly, this model includes; existing building information, variety of map layers, ownership history of the property.

Even though, this model have mapped some case for selective purpose but through advancing that overall the system with relevant work would be handle within a single display and helps to solve huge multilateral national problems.

Figure5.1: Final model map of the building value appraisal

Generally, the property value variation has vigorously affecting the entire the property market and utilization particular in urban areas. Then the residents have less awareness to understand the practices and advantages about scientific property valuation. The existed system and it application have not significant role for the betterment of the society life; it is not well studied and organized way. Even through, they have limited experts in the field area; the government and non-government offices have awareness who should done property valuation then conducted by similar field of studies like accounting, economics, civil and construction engineering e.t.c. The variables and characteristics of property attributes have not analysis with the required methods and standards. The practice of existed property valuation has following too late system. As results, the value variation in similar property and less satisfaction clients all these recognized as consequences of constraints.

Even through, to analysis the building property value with required standard and quality, it needs registered property information system however based on the existed ground this study have define the roots cause for high valuation through integrated model of GIS and HPM. This means that the spatial content of the property model and mapping the GIS application whereas for the tabular data of the property analyzed via the SPSS data analysis and model using HPM to emphasize the characteristics of the property attribute. Therefore, the GIS, HPM and statistical analysis for property valuation is effective over contemporary approaches to mitigate the existed drawbacks of property valuation system.

5.2 Recommendations

According to investigated findings, the recent global advancement and local challenges of the contextual application and multitude effective of the valuation system over the society being tremendous role to bring radical change in household and sectors level by addressing accurate, fair and economical fit practice of valuation system. Accordingly, to finding results of this research study that expected to contribute fundamentally for the following areas.

- ❖ It must use for academic purpose as reference, practical guidance, teaching materials and lab manuals purpose in empowering progressive professionals development.
- ❖ It have significant role for governmental and non-governmental organization to use as input for policymaking and framework establishing. In addition, different sectors or institutions, which facilitate valuation system to understand the basis and to apply at least with minimum standards to have improved, practice of valuation system professionally.
- ❖ It must have to great advantage for advancing the property administration and information system footprints. This also, helps the society to aware and open to be digital solution maker for the future.
- ❖ This should play great role for financial institutions and other sectors to alert for advance and improved the practices of valuation system. Also, motivates to introduce the modern system real property identification and administration like cadastral and registration system.

5.2.1 Recommendation for immediate and eventual actions

- ✓ The government should enhance system of property valuation with suitable and sustainable environments through technological advancement, institutional framework, awareness creation, property valuation system and professional development.
- ✓ Cadastral system and property registration must be required as one of the urgent issue.
- ✓ Financial sectors, specifically banks must advance the system of valuation comprehensively towards the purpose of valuation in their institution more than comparing each other's.
- ✓ Particular government sectors have specially municipality, cadastral office, and construction and property valuation offices have a moderate to follow the proper standard and requirements.

- ✓ Professionals have to respect their profession and give credit for their works that deserves to create positive impact over life of society.

5.2.2 Recommendation for future further researches and project works

- ✓ Applying integrated approaches for actual appraisal value through verification and validation processes.
- ✓ Significance of advance the property valuation for real estate development to have secure, fair and affordable transaction system in both parts.
- ✓ Dissemination of the actual property value analyzed through integrated system using Python programming.
- ✓ Produce the desirability model of property value using visual geocoding via virtual website.
- ✓ Role of property registration to create suitable and sustainable socio-economic for stable society using Artificial Neural Network (ANN).
- ✓ Property registration and spatial database infrastructure for indispensable system and regularization of the property administration, particularly in urban areas.
- ✓ Application cadastral system for advance and accessible property administration system.
- ✓ Time-space dynamics of property navigation for autonomous users service accessibility

The advance and standardize property valuation practice should be based on purpose and proper standard through professionals accurate and precise value measuring. Because, the result of good valuation practice lead to have affordable, equitable and secure property resource mobilization under the considerable circumstances.

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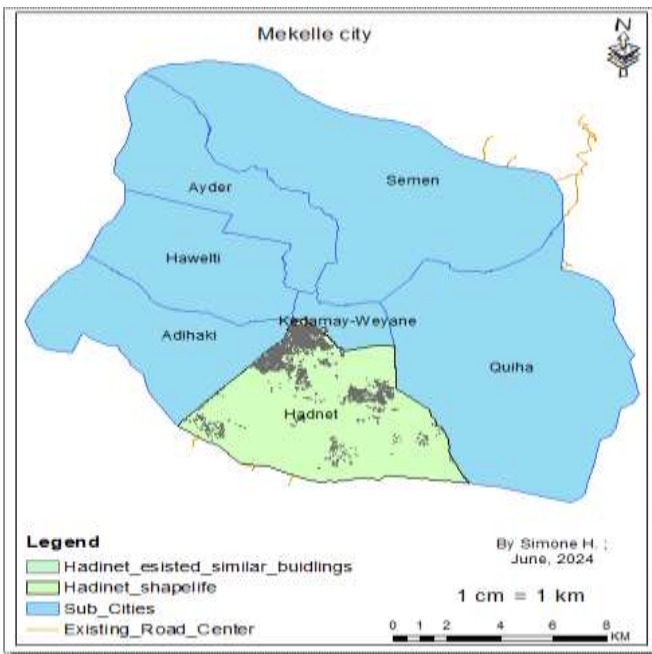
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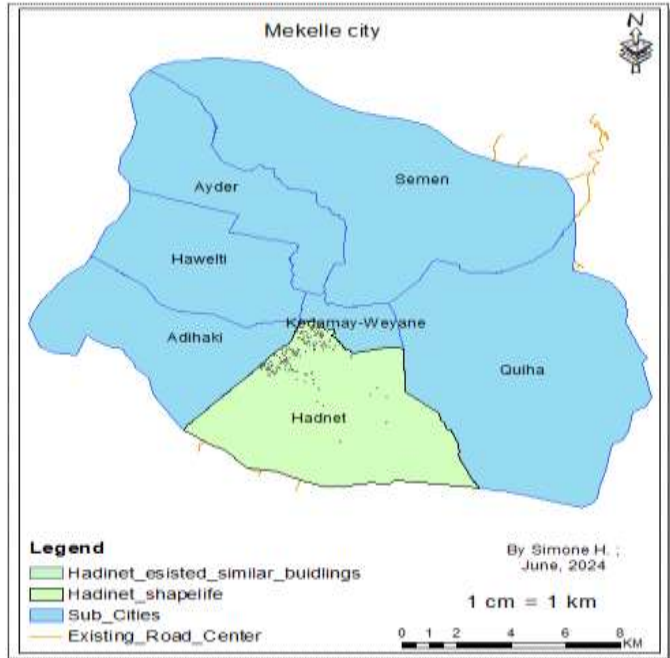
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Appendixes

App-A 1– A: maps



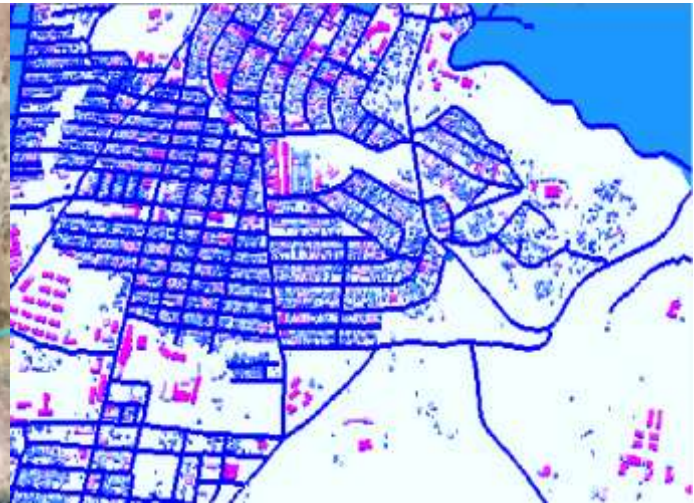
(a) Mekelle shapefile & existing building of HSC



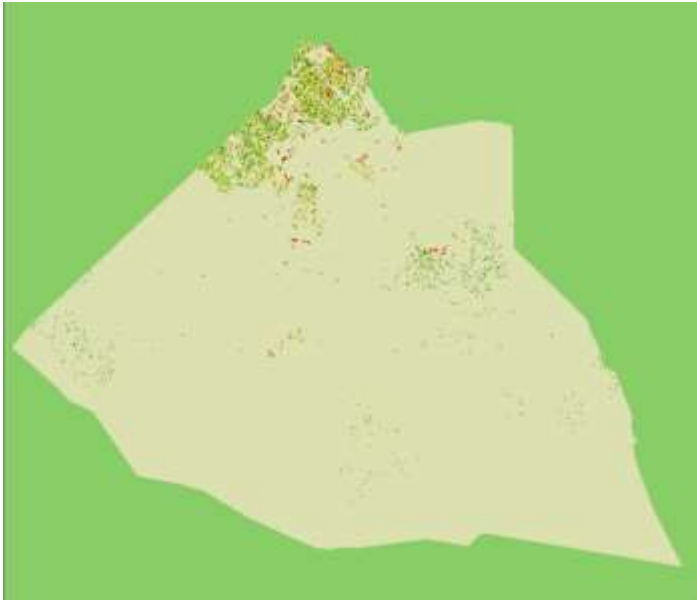
(b) Sub cities and HSC similar buildings



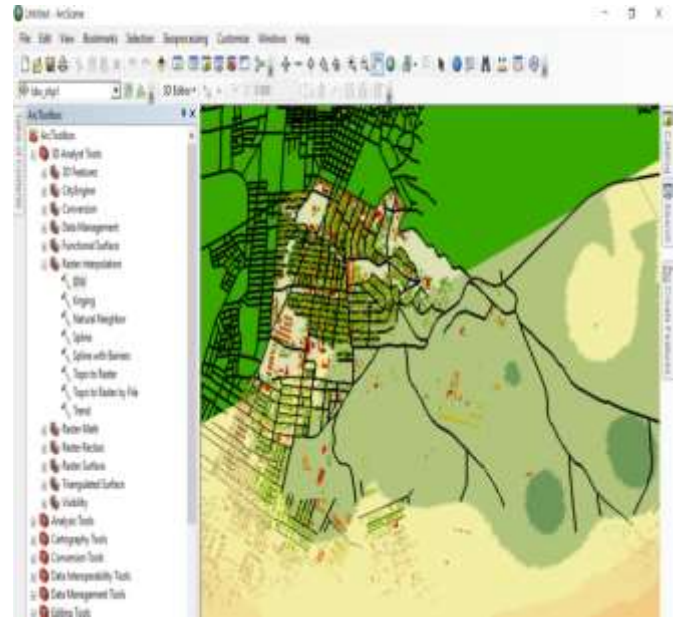
(c) Mekelle city Orthophoto (UDHA, 2011)



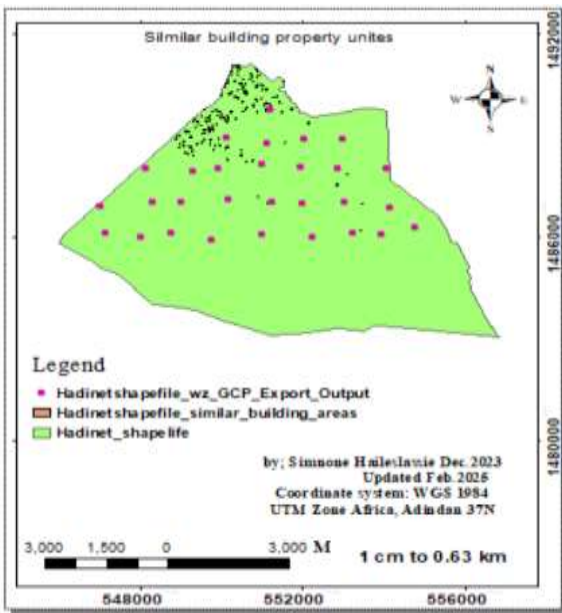
(d) 3D-building, road network, zoning and map value layers



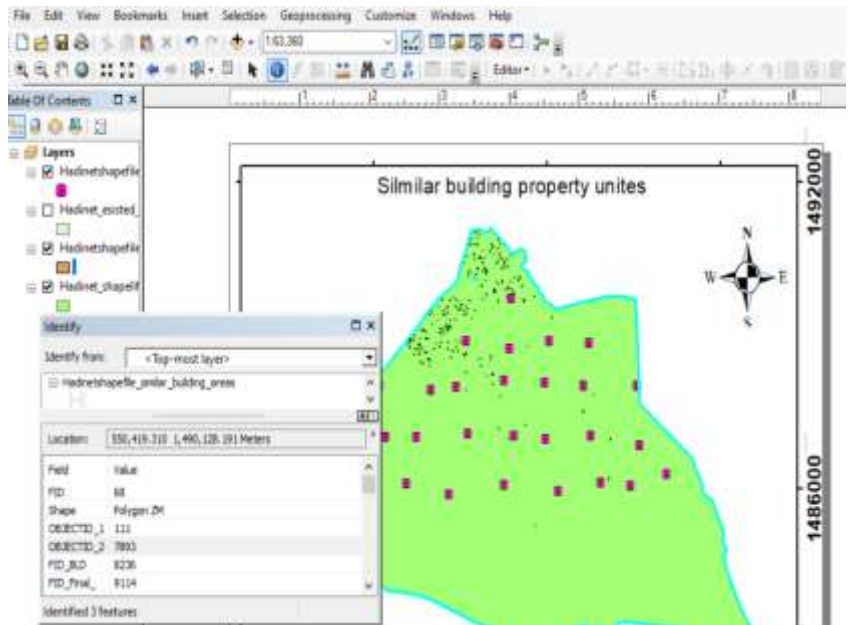
(e) 3D building model of HSC



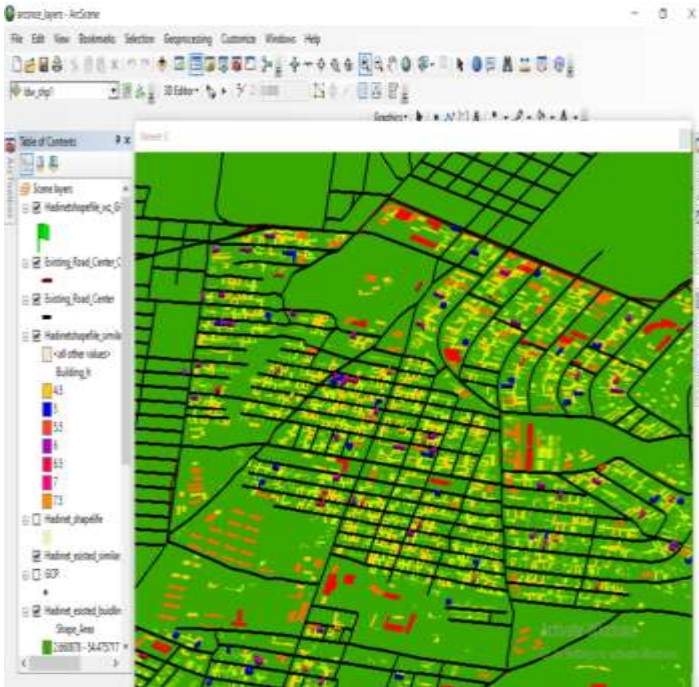
(f) IDW & Map height of the building property



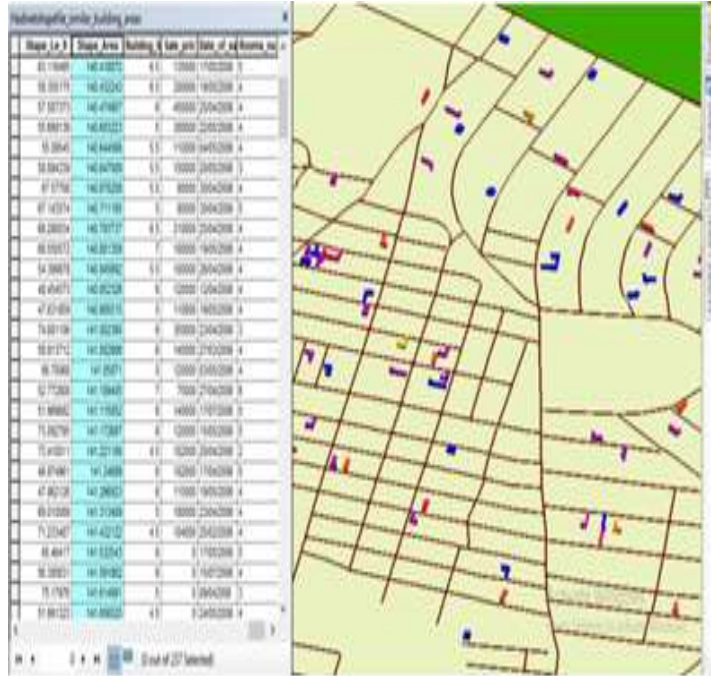
(g) GCP points of map HSC



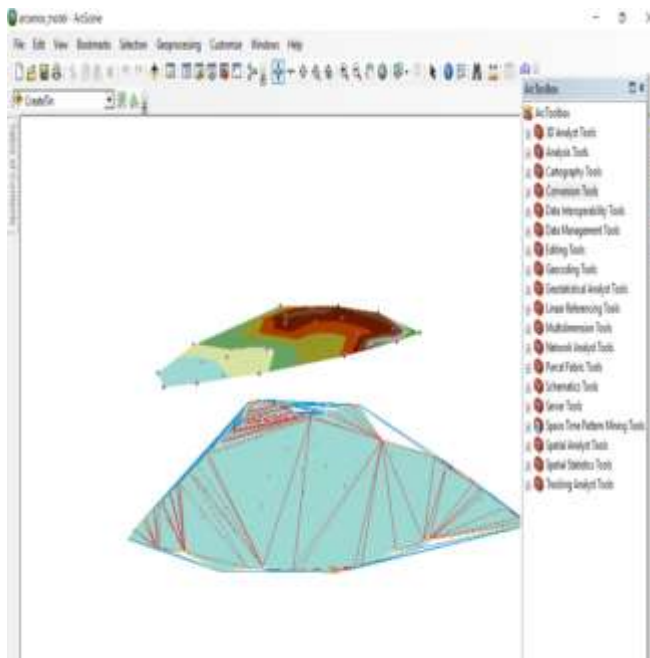
(h) Defining location of similar building property



(i) DSM of the target group



(j) 3D model of the similar buildings and attributes data

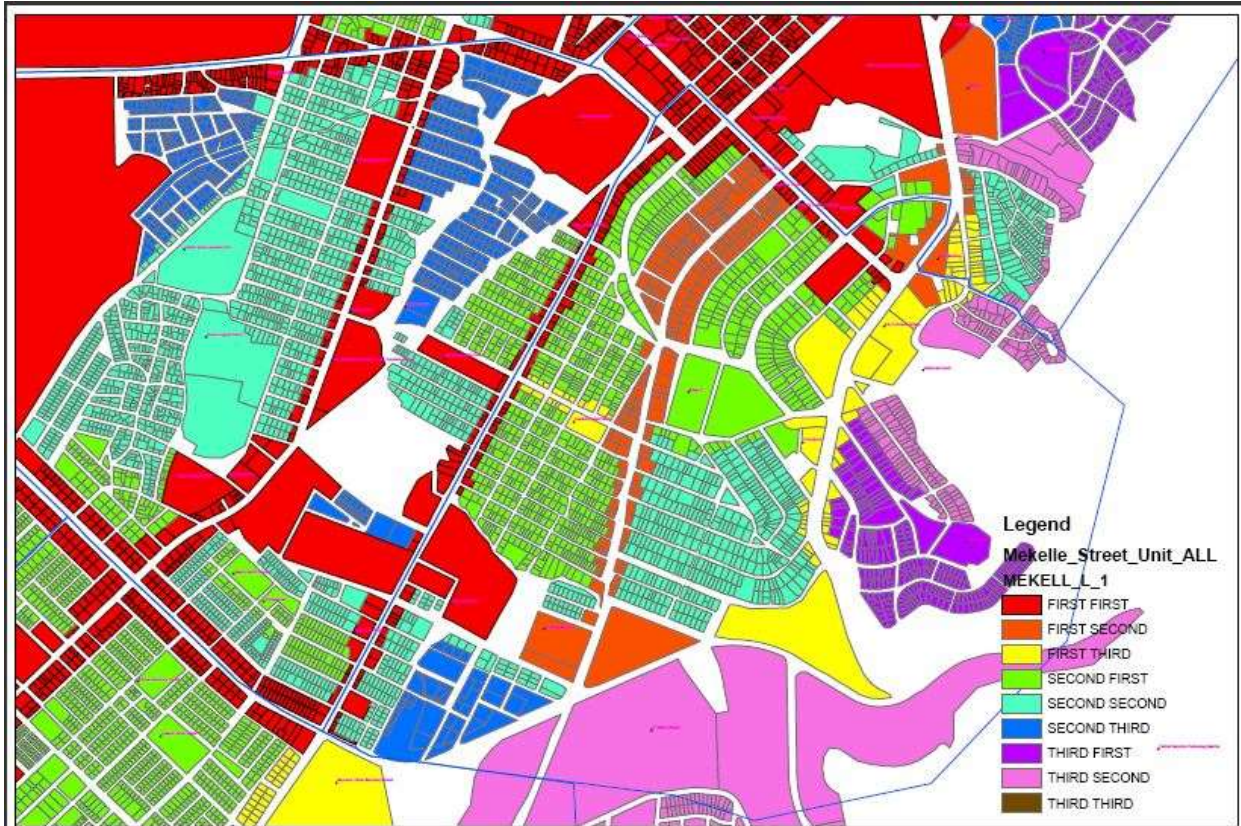


(k) TIN and coordinate network



(l) Multilayer map

A 1 Figure 1: Maps representation used as study source



A 1 Figure 2: Hadinet land use map

Source: Municipality of Hadinet Sub city

App-A 2: Table ad graphs

A2 Table 1: Structural arrangement and quantity of the data collection results

No.	Target group	Data collection number			Mode
		Data collection Inst.	Proposed	Collected	
1	Residents transaction made	Questionnaires	105	97	Written and local language translated
		FGD	2	2	
2	Hadinet municipality	Interview	30	30	Both written and oral interviews
		FGD	1	2	
3	Six selective banks	Interview	24	42	Both written and oral interviews
		FGD	6	6	
4	Municipality of Mekelle City Administration (MMCA)	Interview	8	7	Both written and oral interviews
		FGD	3	2	
5	Regional Land & related Agencies & Investment Bureau (RLRAIB).	Interview	15	16	Both written and oral interviews
		FGD	3	3	
6	Property brokers	Interview	10	9	Both written and oral interviews.

A2 Table 2: Registered sale data of similar building property

1	Sub city	Parcel code	Function	Area	Sale price	Zone	Room s	Sale_date	1	Sub city	Function	Area	Sale price	Zone	Distance to center	Date of sale
2	Hadinet	Arc 207	Residence	140	105,000	2	4	25_02_2006	2	Hadinet	Residence	141.1	450,000	3	2500	19_02_2006
3	Hadinet	Sr 2325	Residence	140	540,000	1	5	05_03_2006	3	Hadinet	Residence	140	48,000	4	3850	20_02_2006
4	Hadinet	Arc 65	Residence	140	150,000	2	5	06_03_2006	4	Hadinet	Residence	140	105,000	4	3120	25_02_2006
5	Hadinet		Residence	140	350,000	2	6	26_03_2006	5	Hadinet	Residence	140	150,000	4	4500	26_02_2006
6	Hadinet	AD14	Residence	140	200,000	2	5	26_03_2006	6	Hadinet	Residence	140	120,000	3	3455	22_05_2006
7	Hadinet	-	Residence	140	300,000	1	4	30_03_2006	7	Hadinet	Residence	140	110,000	3	2650	11_03_2006
8	Hadinet	ARC 47	Residence	140	110,000	1	3	25_03_2006	8	Hadinet	Residence	140	130,000	4	1973	12_03_2006
9	Hadinet	Arc 89	Residence	140	150,000	2	3	01_04_2006	9	Hadinet	Residence	140	450,000	3	2050	19_03_2006
10	Hadinet	AYC 90	Residence	140	210,000	2	4	16_04_2006	10	Hadinet	Residence	146.25	80,000	3	2680	26_03_2006
11	Hadinet	SR 2326	Residence	140	110,000	2	3	18_06_2006	11	Hadinet	Residence	150	80,000	3	2500	07_04_2006
12	Hadinet	1305	Residence	140	140,000	2	4	19_06_2006	12	Hadinet	Residence	140	100,000	4	3560	28_06_2006
13	Hadinet	006/009	Residence	140	120,000	2	3	18_06_2006	13	Hadinet	Residence	140	100,000	4	3350	28_06_2006
14	Hadinet	AYC 105	Residence	140	102,000	2	3	20_06_2006	14	Hadinet	Residence	140	120,000	3	2567	06_06_2006
15	Hadinet	AYC 5	Residence	140	102,000	2	3	12_04_2006	15	Hadinet	Residence	140	75,000	3	1890	20_06_2006

Source: Ethiopian urban development and housing, 2020)

A2 Table 3: Real sale data of building property 2013 - 2021

1	Date of sale	Years	Zone	Area (M2)	Price (Bir)
2	5/7/2005	2005		200	150,000.00
3	5/7/2006	2006	2	246	1,000,000.00
4	4/18/2006		2	200	200,000.00
5	2/25/2007	2007	1	300	150,000.00
6	4/6/2007		1	400	820,000.00
7	2/25/2008	2008	2	200	200,000.00
8	7/16/2008		1	300	200,000.00
9	2/22/2009	2009	1	200	200,000.00
10	6/17/2009		2	200	700,000.00
11	12/5/2009		1	300	250,000.00
12	5/21/2010	2010	2	140	80,000.00
13	12/5/2010		1	400	250,000.00
14	1/11/2011	2011	1	256	380,000.00
15	3/13/2011		2	257	125,000.00
16	4/23/2011		1	257	1,100,000.00
17	4/23/2011		2	140	1,300,000.00
18	3/18/2011		1	400	1,500,000.00
19	1/11/2011		2	200	200,000.00
20	2/21/2011		1	200	3,000,000.00
21	5/27/2011		2	200	1,000,000.00
22	7/2/2011		1	400	5,000,000.00
23	12/8/2011		2	256	380,000.00
24	2/22/2012	2012	1	400	200,000.00
25	2/26/2012		1	400	200,000.00
26	3/2/2012		1	140	1,550,000.00
27	3/4/2012		1	200	1,000,000.00
28	3/16/2012		2	500	35,000.00
29	2/22/2012		1	400	200,000.00
30	4/4/2012		2	400	55,000.00
31	5/15/2012		2	200	800,000.00
32	5/15/2012		2	300	400,000.00
33	6/30/2012		1	70	2,000,000.00
34	7/17/2012		1	250	1,500,000.00
35	12/1/2013	2013	2	140	400,000.00
36	6/24/2013		1	140	4,000,000.00
37	6/24/2013		1	74	3,200,000.00
38	12/4/2014	2014	2	140	8,000,000.00
39	12/17/2014		1	140	4,000,000.00
40	12/20/2014		1	140	5,000,000.00
41	11/27/2014		2	400	200,000.00
42	11/27/2014		1	140	1,400,000.00
43	12/20/2014		1	140	5,000,000.00
44	12/20/2014		2	140	150,000.00
45	4/18/2015	2015	1	200	800,000.00
46	5/2/2015		1	140	5,000,000.00
47	5/3/2015		1	140	3,000,000.00
48	5/2/2015		1	140	1,700,000.00
49	5/20/2015		1	200	800,000.00
50	5/26/2015		1	140	1,500,000.00
51	5/26/2015		2	140	4,000,000.00
52	6/6/2015		1	140	9,300,000.00
53	6/7/2015		1	140	3,000,000.00
54	7/13/2015		1	175	1,600,000.00
55	7/14/2015		2	175	1,300,000.00
56	9/25/2015		1	140	4,000,000.00

Source: (Private consultancy office, 2023)

A2 Table 4: Officially, registered sale value of building property from GIS attributes

FID	Shape *	OBJECTID_1	OBJECTID_2	FID_BLD	FID_Final_	FID_Polygo	LandUse_1	Shape_Le_8	Shape_Le_9	Shape_Area	Sale_pric	Date_of_sa	Rooms_nu	Zone
160	Polygon ZM	246	10972	11315	12193	-1	Residential	48.978441	47.122555	140.232851	540000	17/05/2006	4	1
65	Polygon ZM	107	6956	7299	8177	-1	Residential	59.898784	57.587373	140.474957	450000	25/04/2006	4	1
1	Polygon ZM	4	4089	4432	5310	-1	Residential	57.584975	49.429834	150.963152	400000	27/02/2006	4	1
58	Polygon ZM	96	6716	7059	7937	-1	Residential	76.794478	74.681106	141.002395	350000	23/04/2006	3	1
193	Polygon ZM	293	12222	12565	13443	-1	Residential	55.551215	55.669139	140.603223	300000	22/05/2006	4	1
78	Polygon ZM	127	7190	7533	8411	-1	Residential	69.31245	69.31245	150.673949	250000	30/04/2006	5	2
77	Polygon ZM	126	7187	7530	8408	-1	Residential	67.500544	67.512214	150.28365	220000	30/04/2006	3	1
64	Polygon ZM	105	6951	7294	8172	-1	Residential	68.53175	68.290034	140.793737	210000	25/04/2006	4	2
177	Polygon ZM	270	11523	11866	12744	-1	Residential	57.810679	58.350175	140.432243	200000	19/05/2006	4	2
172	Polygon ZM	263	11377	11720	12598	-1	Residential	65.796215	64.797929	148.011529	185000	18/05/2006	5	3
59	Polygon ZM	97	6827	7170	8048	-1	Residential	71.013052	69.010089	141.313409	180000	23/04/2006	4	1
85	Polygon ZM	136	7611	7954	8832	-1	Residential	63.994543	63.079524	150.635477	180000	03/05/2006	4	3
26	Polygon ZM	42	5207	5550	6428	-1	Residential	64.256421	47.675033	140.245831	150000	04/04/2006	5	2
82	Polygon ZM	132	7366	7709	8587	-1	Residential	79.301419	72.897005	140.164089	150000	03/05/2006	4	4
191	Polygon ZM	289	12013	12356	13234	-1	Residential	57.145281	58.894339	140.647009	150000	20/05/2006	3	2
20	Polygon ZM	31	5655	5998	6876	-1	Residential	59.913712	59.913712	141.002906	140000	27/03/2006	4	2
235	Polygon ZM	351	80243	0	0	0	Residential	60.120189	51.969682	141.115052	140000	17/07/2006	5	2
154	Polygon ZM	238	10763	11106	11984	-1	Residential	65.30707	63.116495	140.418072	135000	17/05/2006	5	2
2	Polygon ZM	6	4107	4450	5328	-1	Residential	52.156491	52.687785	140.362012	130000	30/02/2006	5	4
34	Polygon ZM	57	5700	6043	6921	-1	Residential	54.218939	48.454573	140.852326	120000	12/04/2006	4	3
57	Polygon ZM	93	6682	7025	7903	-1	Residential	45.674899	47.961772	140.195279	120000	23/04/2006	5	3
84	Polygon ZM	135	7609	7952	8830	-1	Residential	66.70068	66.70068	141.05871	120000	03/05/2006	4	2
147	Polygon ZM	227	10314	10657	11535	-1	Residential	74.169893	73.092795	141.172897	120000	15/05/2006	5	2
179	Polygon ZM	275	11670	12013	12891	-1	Residential	47.194227	47.862126	141.296923	115000	19/05/2006	4	2
88	Polygon ZM	140	7769	8112	8990	-1	Residential	57.306081	55.09545	140.644566	110000	04/05/2006	4	1
113	Polygon ZM	185	8942	9285	10163	-1	Residential	57.700331	58.563526	140.299385	110000	09/05/2006	5	3
180	Polygon ZM	276	11678	12021	12899	-1	Residential	49.51238	47.631859	140.985515	110000	19/05/2006	4	2
49	Polygon ZM	77	6083	6426	7304	-1	Residential	64.131385	64.131385	140.179106	105000	19/04/2006	4	2
199	Polygon ZM	302	12736	13079	13957	-1	Residential	50.106137	48.153237	140.135972	105000	24/05/2006	5	4
63	Polygon ZM	103	6893	7236	8114	-1	Residential	71.533969	71.233487	141.432122	104000	25/02/2006	4	2
40	Polygon ZM	66	5890	6233	7111	-1	Residential	50.68172	46.974961	141.246889	102000	17/04/2006	5	2
54	Polygon ZM	84	6481	6824	7702	-1	Residential	72.917171	73.410011	141.221106	102000	20/04/2006	2	2
68	Polygon ZM	111	7893	8236	9114	-1	Residential	52.060729	54.399978	140.845892	100000	26/04/2006	4	4
188	Polygon ZM	284	11968	12311	13189	-1	Residential	68.879178	68.550572	140.801359	100000	19/05/2006	4	4
73	Polygon ZM	117	7071	7414	8292	-1	Residential	67.007337	67.143574	140.711195	80000	30/04/2006	5	3
75	Polygon ZM	124	7173	7516	8394	-1	Residential	67.577116	67.57708	140.670208	80000	30/04/2006	4	3
128	Polygon ZM	202	9527	9870	10748	-1	Residential	67.680637	67.820021	150.003807	80000	10/05/2006	4	3
202	Polygon ZM	307	13020	13363	14241	-1	Residential	61.523893	56.614094	146.378279	80000	25/05/2006	6	3
70	Polygon ZM	113	7035	7378	8256	-1	Residential	61.425534	52.772808	141.109405	75000	27/04/2006	6	3
5	Polygon ZM	11	4210	4553	5431	-1	Residential	47.758574	47.758574	140.036142	48000	03/03/2006	5	4

Source: Ethiopian Urban development and Housing, 2020 or (MUDHC, 2014)

A2 Table-5; Real practice of MHSC's property valuation for compensation purposes

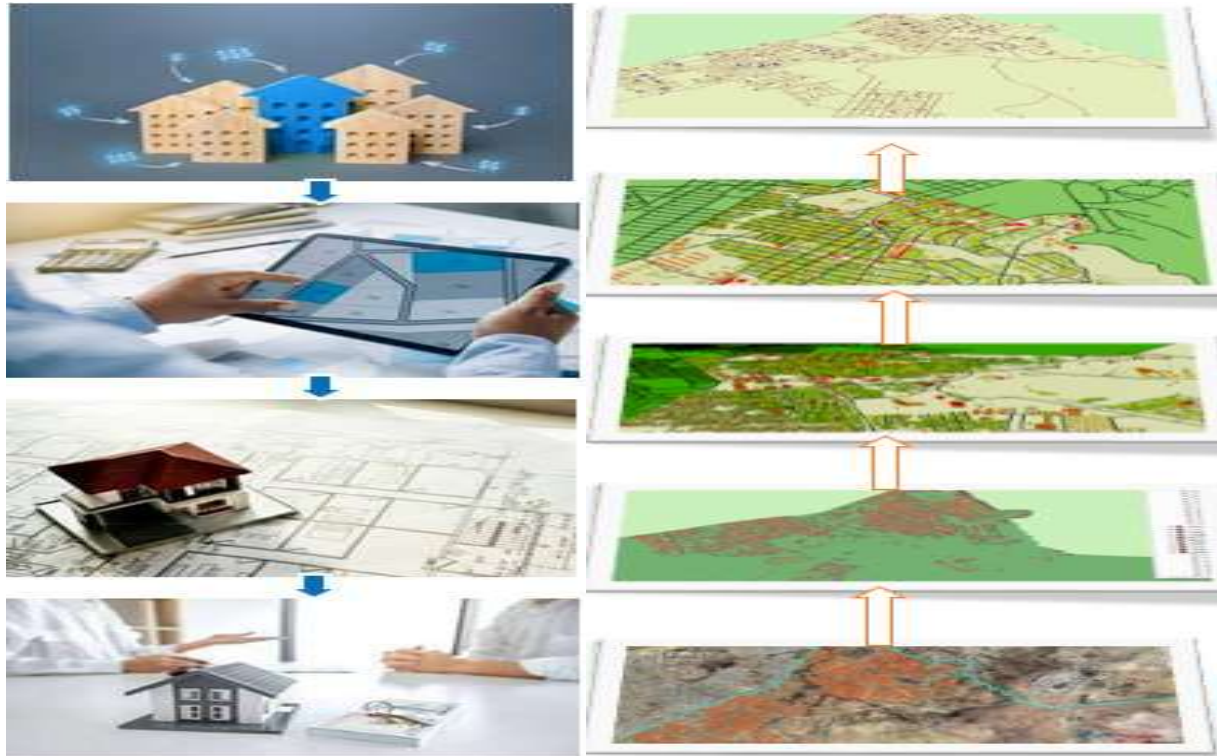
ብመሰረት እፈድረ ዝወፀ ኣዋጅ ቁፅረ 455/1997 ዓንቀፅ 14/2 ተመሓይሹ ዝወፀ ሕገመንግስቲ ትግራይ ኣዋጅ ቁፅረ 45/94 ዓንቀፅ 56/7 ብተወሰኺ ናይ ኢትዮጵያ መንገድታት ቦዓል ስልጠን ዘውፀኦ መምርሒ ቁፅረ 1/2009 ዓ/ም መሰረት ዝገበረ ናይ ገጠር መሬት ካሕሳ መክፈሊ መጠየቕ ችግሩ

ታ.ቁ.	መሬት ዝተወሰደሎም ገበራት ምሉኡ ስም	ተሓራሲ መሬት ዝተወሰደሉ ቦታ ኣይናለም	ናይ ገብረት ዓይነት	መለክዓ	ስፍራት(U)	ምህርቲ ባህቲታር (ኩንታል) (A)	ናይ ካሕሳ ዓመት(ሓ)	ጠቅላላ ብዛት(መ=U*A*ሓ)	ነይላ ዋጊ(ሠ)		ጠቅላላ ዋጊ(ረ=መ*ሠ)		ፊርማ ቦዓል ትሕዝቶ
									ብር	ሣ	ብር	ሣ	
1	ሙሉ ሓገስ ገ/ሰላሴ	ኣይናለም	ተሓራሲ መሬት	ሄ/ር	8175	28.4	15	348.25	1,851.41	644,753.53			
		ኣይናለም	ሓሰር	ሄ/ር	8175	53.3	15	653.59	460.00	300,651.40			
		ጠቅላላ ድምር										945,404.93	
2	ኪሮስ ደበሳይ ገርኦ	ኣይናለም	ተሓራሲ መሬት	ሄ/ር	10013	28.4	15	426.55	1,851.41	789,718.94			
		ኣይናለም	ሓሰር	ሄ/ር	10013	53.3	15	800.53	460.00	368,243.80			
		ጠቅላላ ድምር										1,157,962.74	
3	መብራህቱ ፀጋይ ቦርሀ	ኣይናለም	ተሓራሲ መሬት	ሄ/ር	9019	28.4	15	469.4	1,851.41	869,051.85			
		ኣይናለም	ሓሰር	ሄ/ር	9019	53.3	15	880.96	460.00	405,241.60			
		ጠቅላላ ድምር										1,274,293.45	

ተ.ቁ.	ኣባላት ካሕሳ ኮሚቴ	ሓላፊነት	ፊርማ
1			

ናይ ክ/ከተማ ማ/ቤት ሓላፊ/ተወካይ ሙሉኡ ስም:- _____

App-A 3: Multi layers building map property in 3D Design and model



Sources: (a) Property value sources

(b) Study authors

Sources: (Property valuation online images and Author property model, 2024)

App-A 4: Attracted documents files and photos

A3-Photos1: Screenshot of valuation documents



ኤብሪት ባንክ አ.ማ.
UNITED BANK S.C.

Property Estimation Guideline

August 2015
Addis Ababa

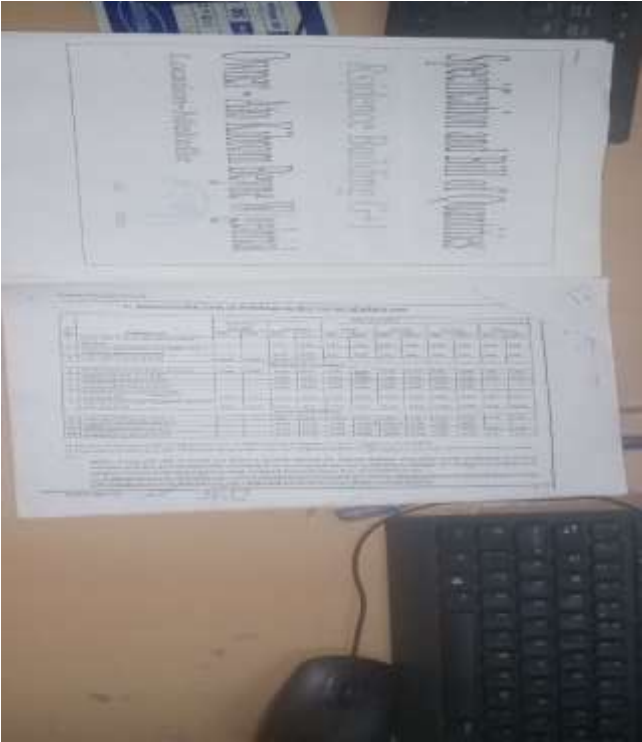
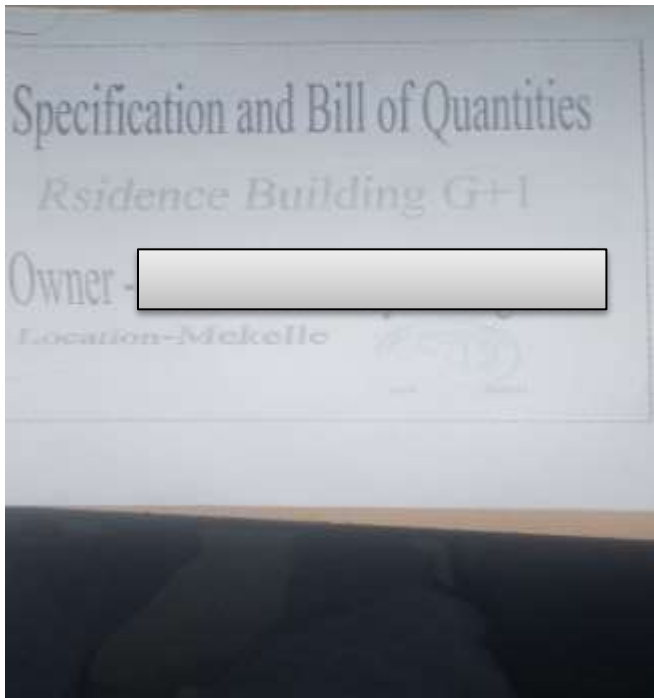


Range of replacement cost as per the classification of buildings /For Addis Ababa

Building Types	Unit	Excellent/ Excellent	1 st Class/V.Good	2 nd Class/Good	3 rd Class/Average/Normal	4 th Class/Fair/Economy	5 th Class/Poor/Minimum
1. Lower Villa or Class wall Residential, Commercial (C-0) single story, HCB (wall higher than 2m)	M ²	Not Applicable	18,406 - 11,447	Not Applicable	3,123 - 3,26	3,475 - 3,612	3,117 - 4,175
2. Residential (C-1) up to C-2	M ²	13,596 - 11,719	11,371 - 11,526	11,371 - 11,571	9,266 - 10,337	8,504 - 9,266	7,689 - 8,504
3. Residential (C-1) up to C-2	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
4. Commercial (C-1) up to C-2	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
5. Commercial (C-1) up to C-6	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
6. Commercial (C-1) up to C-10	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
7. Commercial (C-1) up to C-12	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
8. Commercial (C-1) up to C-15	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
9. Hotel and Guest House	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
10. Three Storey (C-0)	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
11. Three Storey / industry factory (C-1 & above (C-2)	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
12. Multi Storey, Hall (C-0) (not in (C-1 & above (C-2)	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
13. Hospital/clinic (C-1 and above)	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767
14. Sentimental Building	M ²	11,371 - 11,506	11,335 - 11,371	9,266 - 10,337	8,504 - 9,266	7,767 - 8,543	6,990 - 7,767

Note that: *Items of building such as passage & goods elevators, escalators, central AC, generator, water tank & ground management.

Activate Window



Project: [Illegible]

A. Estimated values in Dollars (convert to Rupee 1:100)

Item	Quantity	Unit Price		Amount		Total
		Rate	Unit	Rate	Unit	
Excavation	1000	100	m ³	100000	100000	100000
Concrete	500	200	m ³	100000	100000	100000
Brickwork	10000	100	m ²	1000000	1000000	1000000
Roofing	500	200	m ²	100000	100000	100000
Plumbing	100	1000	m	100000	100000	100000
Electrical	100	1000	m	100000	100000	100000
Painting	1000	100	m ²	100000	100000	100000
Sanitary Installation	100	1000	m	100000	100000	100000
Aluminium Installation	100	1000	m	100000	100000	100000
Other	100	1000	m	100000	100000	100000
Total						5000000

ESTIMATE OF WORKS AND MATERIALS

Sl. No.	Description	Unit	Quantity
A. SUBSTRUCTURE			
1	Excavation and Earth Works	M ³	22,820.00
2	Concrete Works	M ³	84,284.00
3	Masonry Works	M ²	16,124.33
	Total A	M ³	123,228.33
B. SUPERSTRUCTURE			
1	Concrete Work	M ³	167,908.32
2	Masonry & Brick Work	M ²	82,394.89
3	Roofing	M ²	1,000.33
4	Carpentry & Joinery	M ³	12,000.00
5	Steel Works	M ²	22,127.07
6	Plumbing Works	M ³	26,234.01
7	Electrical	M ³	2,200.00
8	Painting	M ²	12,000.00
9	Sanitary Installation	M ³	20,000.00
10	Aluminium Installation	M ³	18,200.00
	Total B	M ³	380,174.52
	Grand Total of Part A & B	M ³	503,402.85

