Methods Using Land Valuation for Sri Lanka

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Methods Using Land Valuation for Sri Lanka

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***Abstract*— The practice of evaluating the components of a specific piece of land is known as land valuation. Land valuators, overall, use varied approaches for their values, which is a manual procedure and long-term project. In The practice of evaluating the components of a specific piece of land is known as land valuation. Land valuators, overall, use varied approaches for their values, which is a manual procedure and long-term project. In the land valuation process, land valuators must achieve lots of tasks such as considering characteristics, gathering factors, identifying methods, and calculating land value. for achieving this procedure made special tools. but land valuators do not use them because models and applications not working as really, they want. This research was conducted by quantitative and qualitative research approaches target population is Sri Lankan land valuation officers. For the survey and interview, 21 land valuation officers have participated. During this survey and interview, valuation officers were sharing their lots of ideas and problems such as finding land valuation factors, land valuation methods, land valuation Techniques, land valuators Challenges, and implemented Tools for land valuations. 19 or articles are used to gather data and widely describe land valuation methods using Sri Lanka such as Comparative Method, Contractor's basis Method, Residual Method, Investment Method, Profits Accounts Method.**

Keywords— land valuation process, valuation methods, valuation tools, land valuators, land characteristics, land factors

I. Introduction

A. Background

The process of assessing the factors of a certain piece of land is known as land valuation. The approach can be thought of as a way of employing experience and judgment to determine the worth of landed property. The purpose of land valuation, on the other hand, is to arrive at a value, which is sometimes followed by terms such as market value or benefit value [1]. Generally, Land valuators use various methods for their valuations. It's going on a manual process. In this process, the valuation officer must get some reliable sources, unless it would lead to some unexpected values for the land. Following these examinations, he would calculate a rough land value in his brain.

B. Problem

Generally, the traditional land valuation process is a personal-oriented method. Especially land valuators have a lot of tasks to do during this process. Sometimes few methods are needed to calculate the land value. To solve this problem, some models and applications were implemented. But land valuators do not use them, they only do their duty as manual process reason is these models and applications not working as really, they want.

C. Aim and sub-Objective

The aim of this research is to Determine about land valuation process and identify suitable methods used in Sri Lanka. To support the aim of this research, the following objectives are formulated,

- Determined the land valuators' activity process during the land valuation period.
- Identify the suitable characteristics, methods, and techniques for valuating lands.
- Gather information about applications and models for land valuations.
- Finally identify suitable methods and characteristics for land valuation in Sri Lanka.

II. Literature Review

A. Land valuator's activity process

The practice of forecasting the possible use of land based on its attributes is known as land evaluation. These predictions can be made using a range of analytic models, ranging from qualitative to quantitative, empirical to mechanical, and specific to generalized [2], The process of valuation can be defined as the careful assessment of a landed property's worth based on experience and judgment by identifying and evaluating its attributes. The major and specific goal of the valuation process, on the other hand, is to determine "value." [3]. According to [4], The capacity of a property to perform a function determines its value. Functional features in commercial real estate may include,

- Location has an impact such as accessibility to the marketplace, proximity to suppliers of raw materials and important nodes such as railway stations, car parks and open spaces
- Physical characteristics of size, shape, age, and condition
- Legal considerations lease terms and restrictive covenants
- Economic and planning considerations (planning constraints, permitted use and potential for change of use.

All these variables can be divided into two categories: social and physical influences. Most valuation models regard the regional component to be a social factor. Economic and political variables are also included around social elements. Most models consider the physical characteristics of the land parcel such as area, width, depth, shape, location, and terrain, the adjacent land use type such as distance to transportation facility, distance to station, distance to grocery store, and distance to public facility, and environmental conditions

when calculating the physical factors for example, public safety and social welfare as well as land use conditions such as, land use type and land use intensity.

B. Characteristics, Methods and Techniques for Land Valuation

Regarding to Characteristics for land valuation process [5], used adapted the following characteristics to create the model as the Building of the Mass Land Appraisal Method as follows.

$$\text{Land Price Function: } P = f(L, P, T, C) \quad (1)$$

Where P = Land Price, L = Land Characteristics, P = Public Facility, T = Public Transportation, C = Land Use Control

Land Appraisal Model: $P = 12622 + 369.8X1 + 690.6X2 – 6.3X3 + 6.1X4 - 3.5X5 - 20.1X6 + 50.5X7 - 3.1X8 + 16.9X9 - 61.8X10$

Where, X1 = Depth of the Parcel, X2 = Width of the adjacent road, X3 = Distance to bus stop, X4 = Distance to the nearest long distance transportation station, X5 = Distance to the nearest major road, X6 = Distance to CBD, X7 = The degree of land use control, X8 = Distance to the nearest park, X9 = Distance to culture center, X10 = Distance to the nearest college or university.

When consider about land valuation methods, regarding to this [6] article, describe 7 methods for land valuation such as Comparative, Development Method, Allocation Method, Extraction Method, income Capitalization Method, Capitalization of Ground Rent, Belting Method, Guideline Value. However, [6] highlighted, the most widely used method is the value of land is calculated using the comparative method, which involves reviewing recent sale prices of comparable land in the area and modifying the values to account for differences in size, shape, location, and other qualities. However, where there is an active market and transaction prices are readily available, this strategy is effective. The valuation specialist must examine typical prices over time and look for price volatility. Traditional land appraisal processes consider such factors, and while they are empirical and qualitative in nature, substantial information may be gleaned from this data source that can be used in conjunction with data derived from simulations [7].

When considering about methods used in valuation property, [8] has highlighted, the 5 main methods used in valuation property for example Comparative Method, Contractor's basis Method, Residual Method, Investment Method, Profits Accounts Method. In [9] was described as a comparative method Prices and other relevant information created by market transactions involving equal or comparable assets, obligations, or a collection of assets and liabilities, such as a firm, are used in the market method. Market multiples derived from a set of comparable are an example.

In [9] was highlighted about as Cost Approach reflects the amount now required to replace the service capacity of an asset obsolescence and economic obsolescence and is more comprehensive than depreciation for financial reporting or tax purposes. Also, explain how the Income Approach turns future sums into a single present value.

When the income approach is used [9], The fair value calculation is based on current market expectations for such amounts in the future. These strategies for valuing include:

$$\text{Property Value} = \text{Land Value} + (\text{Cost New} - \text{Accumulated Depreciation}) \quad (2)$$

Considering about Residual Method, [8] The residual method, which is a mix of the market approach, the income approach, and the cost approach, was thoroughly described. This is calculated by subtracting development expenditures and the developer's profit from the completed "gross development value" to arrive at the residual value of the development property. Regarding [10], was highlighted about equations of Residual method,

$$\text{Residual Value of Land or Property} = (\text{Gross Development Value}) – (\text{Construction} + \text{Fees} + \text{Profit}) \quad (3)$$

Considering about Profits Accounts Method, In accounting, profit refers to the income distributed to the owner as a result of a profitable market production process. Profit is a metric of profitability, and it is the primary concern of the owner in the income-generating process of market production. There are a variety of profit measurements that are often used. In [11], Highlighted when using the profits method, it's always a good method to have the following easy calculations in mind.

$$\text{Gross Profit} = \text{Gross Earnings} – \text{Purchases} \quad (4)$$

$$\text{Net Profit} = \text{Gross Profit} – \text{Working Expenses} \quad (5)$$

An entity must employ valuation procedures that are acceptable in the circumstances and for which sufficient data is available to estimate fair value, with a focus on relevant observable inputs and a minimum on unobservable inputs. In [9], was highlighted about main 3 of valuation method techniques.

Market Approach,

- The current market price is accessible.

Income Approach,

- Cash Flows that are Directly Identifiable and Using

Cost Approach consider about replacement cost in,

- Doesn't directly generate income.
- There are no market prices that are identical.
- The price needs to be adjusted.

Geographic Information System (GIS) The functions aid in the management of spatial data and the visualization of the results. The developed program enables for the evaluation and presentation of any analogous spatial dataset without the need for advanced computer capabilities [12]. The GIS software's available features were used to manually analyze and integrate data one step at a time. Because the analyses are performed by hand, potential errors may occur during the analysis process [13].

C. Tools for Land Valuation

For eight hydrological years (2001–2008), the management of water resources was assessed in relation to this [14], study basin. The Irrigation Land Environmental Evaluation Tool was used to automate calculations for the

development of water balances in irrigated hydrological basins as well as give a set of indices for evaluating irrigation quality. During the past three research years, hydrological monitoring of the basin allowed for the calibration (2006–2008) and validation (2007–2008) of yearly water balances established using the Irrigation Land Environmental Evaluation Tool. After being validated, the computer software was used to generate irrigation quality indices for the whole study period (2001–2008) using data from the other study years (2001–2005). This enabled for the investigation of irrigation dynamics over time in terms of physical and agronomic variables.

A new software called LSE (Land Suitability Evaluation) was developed and deployed for agricultural land use and stabilizing specialized croplands for the sustainable development of hilly regions. In relation to this, [13]By comparing the data obtained by ALES and LSE, the researchers were able to examine the performance of LSE and the automated land assessment system (ALES) software. In western Nghe An, Vietnam, this study was conducted to compare and verify the results of the ALES and LSE software in determining the optimal lands for orange and tea cultivation. Land appropriateness for orange production was assessed using fifteen ecological criteria, while land suitability for tea cultivation was assessed using ten ecological criteria. The study's findings reveal that the LSE software's land appraisal method has several distinct advantages, including increased flexibility, time savings, objectivity, confidence, and accuracy. It's a brand-new tool for land evaluators, scientists, and managers to utilize when determining site suitability and planning land use. The overall land suitability assessment found that lands highly favorable for orange cultivation span 64,505.9 ha, while those suitable for tea plantation cover 69,388.8 ha, fully matching the regional cultivation planned in the western Nghe And region up to 2030.

Regarding to this study [14], applied to the methodology of comparative analysis developed a tool for the cases of Honduras and Peru to refine draft evaluation indicators while evaluating the systems of both countries for the evaluation of national land administration systems and propose a set of quantitative and qualitative indicators with benchmarks for each that signal possible venues to improve the administration's structure and budgetary/management arrangements. to achieve the following objectives,

- contribute to public sector financing through taxes.
- encourage profitable and sustainable land usage; and
- make land more accessible to low-income populations

The final refined indicators and benchmarks, as well as the conclusions from both case studies, were presented using this manner.

Regarding this study [7], Bonfante proposes a Hybrid Land Evaluation System (HLES), which allows a comparison between plant demands on the one hand and projected future temperatures and soil water regimes on the other.

- Evaluation of thermal conditions. In this study, a storyline is followed for each plant species hybrid and each soil mapping unit in the area to be studied.
- A classic empirical land appraisal approach for discovering limiting factors that crop simulation models cannot account for (such as flooding, surface stones, salt).
- Calculates soil water regimes and associated productions using the quantitative Soil Water Atmosphere Plant (SWAP) model at 100%, 80%, and 60% hypothetical irrigation water availability.

HLES was used to compare two climates in the Destra-Sele area of Italy: "reference" (1961-1990) and "future" (2021-2050), investigating 11 maize hybrids and showing that in the future, 6 hybrids suffered badly at 80 percent water availability and 7 hybrids did not fulfill needs at 60 percent. HLES enables a proactive approach to future water allocation difficulties and provides data for genetic modification studies in terms of establishing hydrological conditions for native plant sites and new hybrid introduction locations. Rather than one-way assessments, HLES gives possibilities to be examined in close engagement with consumers.

Regarding to this study [12], As a result of the LEIGIS program, empirical study can be done within the framework. The model is based on FAO crop land categorization and data that describes an agricultural area in terms of soil mechanics and environment. There are two aspects to the land evaluation.

- physical assessment
- economic assessment

Data for 17 land parameters were used in the physical evaluation of the area, and a Boolean classification method was used. Models for general cultivation and five specific crops (wheat, barley, maize, seed cotton, and sugar beet) are included in the implementation. To map data to scores in terms of land features, a new interpolation function is implemented. Income maximization with market constraints is part of the economic analysis. The expert system was created to assist with land evaluation and to allow for rule changes depending on differing performance observed in different locations.

III. METHODOLOGY

Quantitative and Qualitative research approaches (Mix method) were used in this study within a framework of a survey research design. The population of this study was the land valuators who are working in Sri Lanka. The target population of this study consists of land valuation officers now doing their job. Primary data from this study was gathered through google form via a questionnaire. To the survey total participants are 21 Sri Lankan land valuation officers. The data was collected using valuation officers from variously, these valuation officers have contacted from various areas because research target is collected different ideas and approaches by land valuators used. When interview reviews total participants are 21 land valuation officers who are working in Sri Lanka. They have well-explained research subjects, and it helps to usually open ending questions so that in deep information collect and this interview was conducted in 2 methods phones calls and face to face interviews.

IV. Analysis

When describing the analysis, it was covered by the characteristics and main areas of the land valuation process target find the percentage of Factors, Methods, Techniques, Challenges, Land valuation Tools used in Sri Lanka.

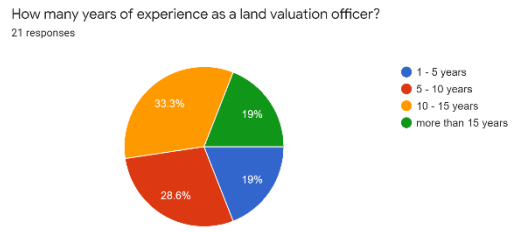

Fig. 1. Years of experience as a land valuation officer

In (Fig 1), shows this survey conducted by the various experience levels of land valuation officers. Mostly participated 10 to 15 experience level land valuation officers. When considering this survey shown minimum participations are in more than 15 years of experience level land valuation officers. this survey target is to get different ideas and more information, then contact various experience levels of land valuation officers to this survey.

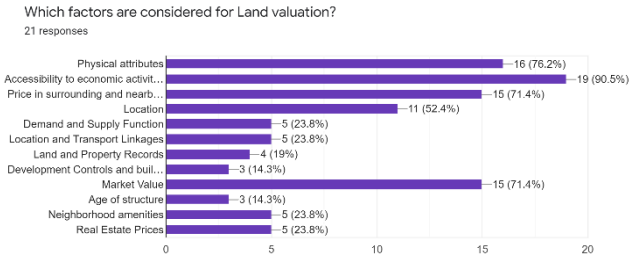

Fig. 2. Factors are considered for Land valuation

Considering results about (Fig 2), It described what are the factors mainly considered before valuation lands. That's are the Accessibility & Land Use, Physical attributes, Location, Price in surrounding and nearby areas, Market Value. Considering this is shown development controls and building bye-laws and age structure most of the time they do not consider for the land valuation.

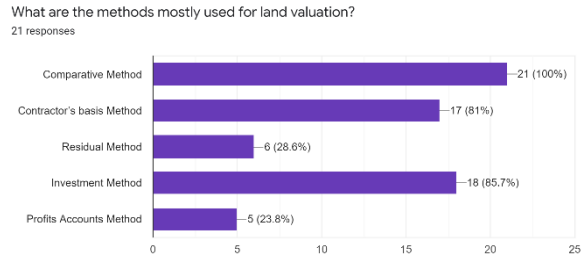

Fig. 3. Methods mostly used for land valuation

When considering about (Fig 3), it shows most of the favorite method is the Comparative method. When looking about this, highlighted 3 of main methods land valuators are used, That's are Contract based method, Investment method, Comparative Method.

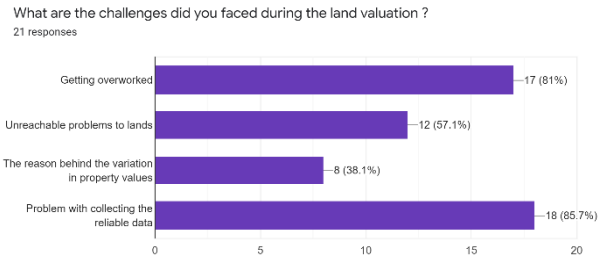

Fig. 4. Challenges during the land valuation

When looking about (Fig 4), mainly land valuators has a achieve a big task of the collecting all the reliable data. And another main challenge is getting overworking. When during the land valuators interviewing they deeply describe those things as time management and analyses all the characteristics.

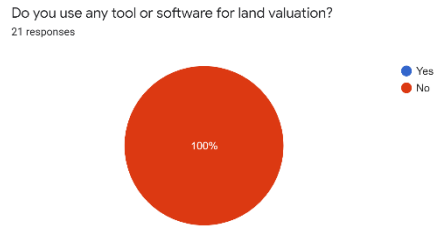

Fig. 5. experience about tool or software for land valuation process

When looking about (Fig 5), land valuators are shown they are generally doing their land valuation process as a manual method. For this reason, land value calculation becomes very hard, and it becomes a long-term process.

V. Results and Discussion

When describing the interview, it was covered by the characteristics and main areas of the land valuation process: Factors, Methods, Techniques, Challenges, Land valuation Tools.

A. *Factors for Land valuation*

Basically, and land valuation officers' number of reasons and factors which influence the price of land, these factors can be grouped into a few categories as the Accessibility & Land Use, Physical attributes, Location, Price in surrounding and nearby area, Market Value, and property price but the various factors which directly or indirectly affect the land value. That's Physical attributes, Accessibility to economic activities, Neighborhood amenities, Present and future land use, Demand and Supply Function, Location and Transport Linkages, Land and Property Records, Development Controls and building byelaws, Real Estate Prices, Age of structure.

B. Land valuation methods

Basically, and land valuation officers used 5 methods, examples of Comparative Method, Contractor's basis Method, Residual Method, Investment Method, Profits Accounts Method. In these 5 methods, they have used to 3 methods mainly. That's Market Approach (Comparative Method), Income Approach (Investment Method), Cost Approach (Contact based).

C. Main method Techniques

The land valuation officer's favorite method is the comparison method but for the land valuation, valuators have used 3 main methods that are Market Approach, Income Approach, Cost Approach used for land valuation. Because sometimes land valuator calculates the land price using 2 times using one more method using these 5 methods. When deeply asking about these few times of calculating, generally they need to satisfy about the corrected land value or some time they must need to use few methods to get a land value. For example, of when calculating building with land price, it needs to use 2 methods of Comparative method and Contract-based.

D. Challenges

Mainly challenges are divided into 2 parts. That's time management and completely analyses all the characteristics. Generally, land valuators have a big problem with time management about analyses characteristics and using few land valuation methods is the main task on the duty. When working on government sector land valuators and other officers are using GIS maps to analyses characteristics. Because all the time they don't go to the lands to analyze the characteristics. when land valuation officers worked in the private sector, they do not use GIS maps or any other maps.

E. Tools or Applications

Nowadays Sri Lankan land valuations do not use any land valuation tools or applications. Generally, land valuators do on only manual processes. The reason is sometimes they need to build land value in a few methods. But they very like to use software or any other tool for their valuations. Because the land valuation process is very hard and pressure for them. When summarizing the questionnaire, it was done by 21 land valuation officers as the interview done. This questionnaire was summarizing the main parts of the Sri Lankan land valuation process as a percentage.

VI. Conclusion

Land valuation is not simple. land valuators must analyze lots of factors about lands. The main task is to identify the factors, methods, techniques. In this process, sometimes they need to do the valuation using one more method. when survey and interview, it was deeply described. during this process lots of land valuators have problems such as, collecting all the reliable data and getting overworking. when considering gathering factors by land valuators some factors don't consider, the reason is the manual process of this person-oriented method. then the manual process has a risk of missed important factors. lots of land valuators favorite method is Comparative method and after the looking these results of interviews and survey it shown lots of land valuations done on Contract based method, Investment method, Comparative Method. without other methods of Profits Accounts Method and Residual Method valuator cannot evaluate Profits Accounts and hypothetical developments but mainly land evaluators favorite methods are Contract based method, Investment method, Comparative Method. When considering about identify the suitable tools for land valuation Sri Lankan land valuators are really like to use software but don't have any application for them. Considering about survey and interview Finally, the researcher proposed a helpful application for land valuators. When implementing this application using the above findings of land valuation methods, land valuation factors will become a good application and it will be helpful for Sri Lankan land valuators. The researcher also concludes that these issues should be resolved immediately.

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