FARU FACULTY OF ARCHITECTURE RESEARCH UNIT UNIVERSITY OF MORATUWA, SRI LANKA
FARU 2022 – 15TH INTERNATIONAL RESEARCH CONFERENCE
www.faru.uom.lk
Independence and Interdependence of Sustainable Spaces

A PROPERTY VALUATION MODEL TO IDENTIFY THRIVING REAL ESTATE OPPORTUNITIES, BASED ON SPATIAL FACTORS

SENADHEERA. S[1*] & WARUSAVITHARANA. E[2]
[1,2] Department of Town & Country Planning, University of Moratuwa,Sri Lanka
[1]s.suwanka@gamil.com, [2] emejayani@uom.lk

Abstract: Traditional valuation techniques are used to evaluate the value of a property in most developing countries, despite the fact that the world is expanding with new technical developments in every discipline, including spatial science. Traditional techniques are primarily biased on physical and economic variables, but not on spatial variables. As a result, the purpose of this study is to investigate the gap in practice in advanced valuation approaches that can grasp the impact of spatial (geographical) variables on a property's value. In order to experiment it, a valuation model using the Geographical Information System has been created for an urban local area that generates the spatial heterogeneity of property values. Also, a coefficient of correlation analysis was carried out to identify relationship strengths with the property's value. Results indicated that in the case study area, the strongest impact on property value is from the spatial variables of distance to main city, distance to major "A" class road and breadth of access road in order. Further, a multi linear regression equation has been derived to generate an estimation of each plot's property assessed value. Ultimately this model could serve as a guidance tool for any real estate party to estimate property values based on spatial variables.

Keywords: *Spatial variables; Valuation model; Property assessed value.*

1. Introduction

With the background knowledge of Traditional valuation methods, the research highlights the need of modern valuation techniques & technologies as, Valuation models as it's not highly in practice in Sri Lanka. This research is identifying which spatial variables are impacting property value to create a local scale model to run valuation data that would identify and justify thriving real estate opportunity patterns.

1.1 RESEARCH PROBLEM

As Oud (2017) expresses, Real Estate Investments' success is behind the "Location, Location & Location" where properties are spatial goods. However, in most of the traditional modelling of valuation, geographical importance is being neglected which leads to inaccurate ratings of valuation. These faults are occurring financial issues as they are directly connected with the taxation, which is a main source of funds for Municipalities and for the real estate trade market in properties (Oud, 2017).

Another problem is that traditional property valuation methods cause uninformative planning decisions since planners encounter a lack of real data on land & property values. In Summary, major research problem is the gap of practice in property valuation modelling approaches in the Real Estate industry in Sri Lanka, incorporating spatial character.

1.2 RESEARCH OBJECTIVES

The primary objective of this research is to identify the impact of spatial variables of properties on their valuation with the use of Spatial Technology
Sub objectives are,

- To identify the spatial variables that impact the property value, in an urban local area
- To investigate the extent these spatial variables can impact the property value of an urban local area in Sri Lanka

1.3 SIGNIFICANCE OF THE STUDY

Studies have shown that the technological embracement in conveying valuation services is increasingly providing higher accurate data which incorporate the spatial characteristics of a property (Oud, 2017). So, such improved

*Corresponding author: Tel: +94 769397713 Email Address: s.suwanka@gamil.com
DOI: https://doi.org/10.31705/FARU.2022.21

models that reflects market price indexes would not only provide the predicted future opportunities but also creates transparency in knowledge between the seller and buyer.

1.4 FLOW OF THE STUDY

As depicted in figure 1, the Research was conducted in two main phases including three analysis stages. In order to achieve the first objective in the first phase, a Cross Reference Analysis (Stage I) between thoroughly discussed literature insights and discussion points from Stakeholders was supervised.

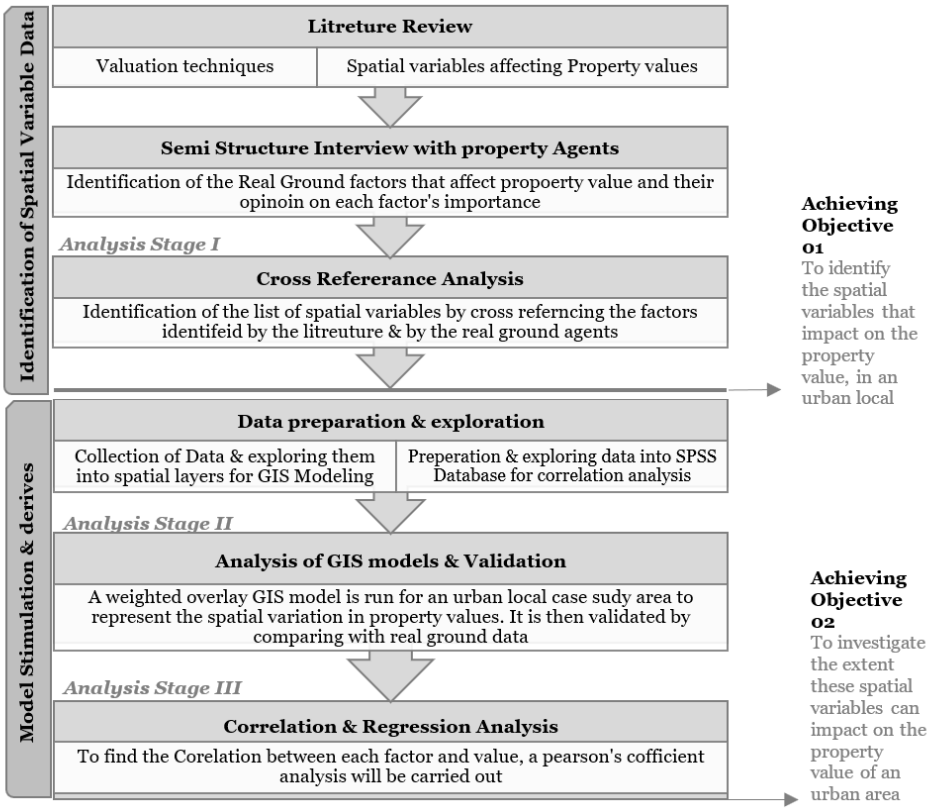

Figure 1, Flow of the study (*Source: Compiled by Author*)

In Second Phase, a geodatabase was digitized to create the model for the case study area (Stage II). The outcome of this phase generates the value variation in the area in terms of spatial variables. Next, the model was validated, and has been used to create a SPSS data base to calculate correlations (Stage III).

2. Literature Review

The literature study explores the background of valuation techniques in both international practices and Sri Lankan norms as well as the advanced valuation systems introduced. This describes different factors that affect a property value and how important the variable "spatial" is.

2.1. CURRENT VALUATION TECHNIQUES

Different countries in the world practice different methods of valuation according to their norms and contexts but in general most of their valuation methods have been derived from two main categories in general practice which are traditional and advanced valuation methods (Modern techniques) (Tao, 2010). Most of the Traditional methods are based on the comparable method principles while advanced valuation techniques impersonate the reflection of the Property trade market (Pagourtzi et al., 2003).

2.1.1 Traditional Valuation Techniques

The most common traditional valuation techniques are, (1) Comparable Method (Market Approach), (2) Investment Method (Income Approach), (3) Profit Method, (4) Contractor Method (Cost Approach) and Residual Method (Development Approach (Pagourtzi et al., 2003; Chan & Abidoye, 2019).

According to Ms. Susanthi Amarasekara, an experienced valuer from the Department of Valuation, these five methods are in use for valuation in Sri Lanka, while other traditional methods such as multiple and step wise regression methods are also used in developed countries.

2.1.2 Advanced Valuation Techniques

Researchers widely use advanced property valuation methods to determine their suitability for property valuation (Adhikari & Agrawal, 2013). The most common modern techniques are (1) Artificial Neutral Network (ANN), (2)

Machine Learning (ML) and (3) Spatial Analysis Method. In a few countries, these advanced valuation methods have been used in practice (Grover, 2016). Some companies in Australia are employing artificial intelligence and automated valuation methods to provide property valuation assessments to the general public (Wilkinson et al., 2017).

Scholars have suggested that in order to increase accuracy, reduce time, and stay relevant in the technological age, a move from traditional property assessment to advanced property valuation is required (Gilbertson and Preston, 2005; Grover, 2016; Wilkinson et al., 2017).

2.2. VALUATION PRACTICE IN SRI LANKA

In Sri Lanka, a property is valued under different purposes such as property purchase and sale, development appraisal, property performance monitoring, loan security (mortgage), tax collection etc. The Government practice of valuation is mostly used in the process of property tax.

The property tax is the main income source of the Sri Lankan local authorities. According to the Municipal Council Ordinance No: 17 of 1865, Urban Council Ordinance No: 61 of 1939 and Pradeshiya Sabha Act No. 21 of 1987 the power of Tax collection is granted to the local authorities by the Government. According to the Department of Valuation these Annual Tax values are generated according to individual property's value in every 5 years. So, the value of a property is determined by the valuer according to the above five traditional methods incorporating his or her experience and judgment. In such scenarios the values are subjective and have no standardization (Wasantha et al., 2012) mostly neglecting the factors as spatial variables, that aren't quantifiably available.

2.2.1 Property Market Value & Property Assessed Value

"Property Value" differs from every Asset Holder, Tax Valuers, Assessors, Brokers because each arrives at a correct numerical figure depending on the objective of the evaluation (Seal, 2019). Likewise, Property Market Value & Property Assessed (Annual) Value are the two different varieties in Property Value.

"Property Market Value" is the likely price at which the property would have been paid at any given moment, based on market conditions at the time. "Property Assessed (Annual) Value" also known as property Taxation Value is a value derived by Municipal or Urban assessors for the purpose of Taxation. So, it's clear that there's an inversely proportionate relationship between the property assessed value and its market value. (Property with higher market value has a higher assessed value).

2.3. FACTORS AFFECTING A PROPERTY VALUE

2.3.1. Physical and Economical Factors

"Housing heterogeneity" is a relatively recent idea in real estate economics where concepts such as "housing uniqueness," are frequently employed to explain price disparities of externally comparable housing units (Vanags et al., 2017). "Physical Heterogeneity" explains the price differences in housing units due to its individuality of the physical structure. It can be differed according to (1) Property Type, (2) Land Plot Size, (3) Gross/Net Floor Area, (4) No of Rooms/ No of Bathrooms, (5) Architectural Design / Usable Layout, etc. (Vanags et al., 2017; Oud, 2017; Santos et al., 2020; Fregonara et al., 2012). Also the economic conditions such as (1) Interest Rates, (2) Economic Indicators such as GDP, GNI, Lending Rates, and (3) Government Laws & Policies etc will also affect property value as it impacts on a person's capability to buy a house.

2.3.2 Spatial Factors

The spatial component, in the form of "position," or "location" has been assigned a crucial role in influencing the valuation of real estate properties (Fregonara, Rolando, & Semeraro, 2012). The term "spatial" variables of a property do not just indicate the advantages of the accessibility but also the physical environment and the social neighbourhood environment. Such as the qualities of the area where the real estate asset is located, or neighbourhood effects. These are known as micro-environmental features in the language of "spatial heterogeneity" because they are related to qualitative aspects relating to the environment or surrounding of the micro local areas, with current infrastructural amenities, and so on (Fregonara et al., 2012). Following are a set of spatial variables identified through several journals, that are impacting property value, considering both the adjacency effect (accessibility) and Neighbourhood effect. (physical and social environments)

Table 1, Set of Spatial variables affecting property value identified through literature

Spatial Variable	**Description**
• Distance to Main City Center	The Main trip attracting center. Higher the functionality, higher the amenities, higher the demand, higher the value.
• Distance to Sub City Center	Sub city, as an activity Node, a trip attraction point is considered as supplementary functional areas in demand
• Distance to Major Roads	Ease of accessibility to the Major Transport Network

• Distance to Railway Stations/ Bus Halts/ Domestic Airports	Ease of accessibility to the Multiple modes of Transportation
• Distance to Highway Entrance / LRT / Monorail/ Subway	Ease of accessibility to the Modern speedy modes of Transportation
• Breadth of Main Access Road	Ease of use (less congestion) in highly used road transportation network
• Distance to Health Institutes / Education Institutes	Proximity to human's requirements
• Distance to Grocery shopping	Proximity to different levels of basic human needs and wants
• Distance to green & blue (Recreational services)	Proximity to relaxation, clean air and mental & physical growth
• Use of Land	In and around (adjacent) land usage category
• Neighborhood Safety	Safer the area, higher the demand, higher the value
• Cleanliness	Visually attractive space with better hygiene and sanitation and no ordure.
• No of Foreign Occupants	Higher the foreign occupants, better the economy, higher the values

3. Research Design and Analysis

Following table 2, explains the overall analysis's outline. It clarifies each analysis stage's mechanism, data collection, and how each analysis is carried out to produce the expected outputs.

Table 2, Analysis Framework

	OBJECTIVE	INPUTS	MECHANISM	OUTPUTS
ANALYSIS STAGE I	Identification of Spatial Variables that affect Property Value & Identification the weight of each factor affecting on Property Value	**Secondary Inputs** Literature/ Newspaper/Articles Ground Discussions Media Interviews **Primary Inputs** Semi Structure-Interview Sheets	In-depth Literature Review & Semi Structure Interviews with three stakeholders in different fields. Cross Reference Analysis	**Output 1:** List of Spatial variables affecting Property Value **Output 2:** Influence % each factor's impact on Property Value
ANALYSIS STAGE II	Spatially Visualize how these identified spatial variables have affected on a Local Case study Area	**Output 1& 2** Geodatabase of Shapefiles, Google Earth, MC Data **Layer of Taxation** digitized by up-to-date out of a sample of 87	GIS Model Builder - **Weighted Overlay Analysis** Geo & Numerical Statistics	**Output 3** Spatial Valuation Index of the Case Study Area (SVI) Validation using Property Assessed Values of the Case Study Area
ANALYSIS STAGE III	Identification of the correlation between each factor with the property value in terms with the Case study Area	**Output 3 SPSS Database** Including Data of Assessed Property, value & numerical value of each factors in 87 samples	Analysis of **Pearson's Correlation** & **Multi Linear Regression**	**Output 4** Coefficient of correlation between each factor & value. Regression Equation

3.1 CASE STUDY AREA

The selected area for the research is the locality of Nugegoda consisting of 15 Grama Niladari Divisions (GND) that are captured within a 2km radius from the City Centre (Figure 2). In total it covers a 9.61 sq. km of area with an average density of 7050 per sq. km. (Census & Statistics Department, 2012).

The Area is covered by two Municipal Councils (MC); Sri J'pura Kotte Municipal Council, Dehiwala-Mt Lavinia Municipal Council and two Urban Councils (UC); Maharagama Urban Council, Boralesgamuwa Urban Council. (Figure 2)

3.2 ANALYSIS STAGE I: Identification of spatial variables that affect property value & their influence %

Stakeholders in different streams involve in real estate were interviewed in a semi structure interview to understand the real ground fundamentals. Their opinions and the variables identified through an in-depth literature review, were cross referenced in order to produce an accurate list of spatial variables and influence percentage on each factor. (Output 1 & 2). The Cross Reference avoids repetition and generates a cohesion of relative data that is more applicable to the Local context

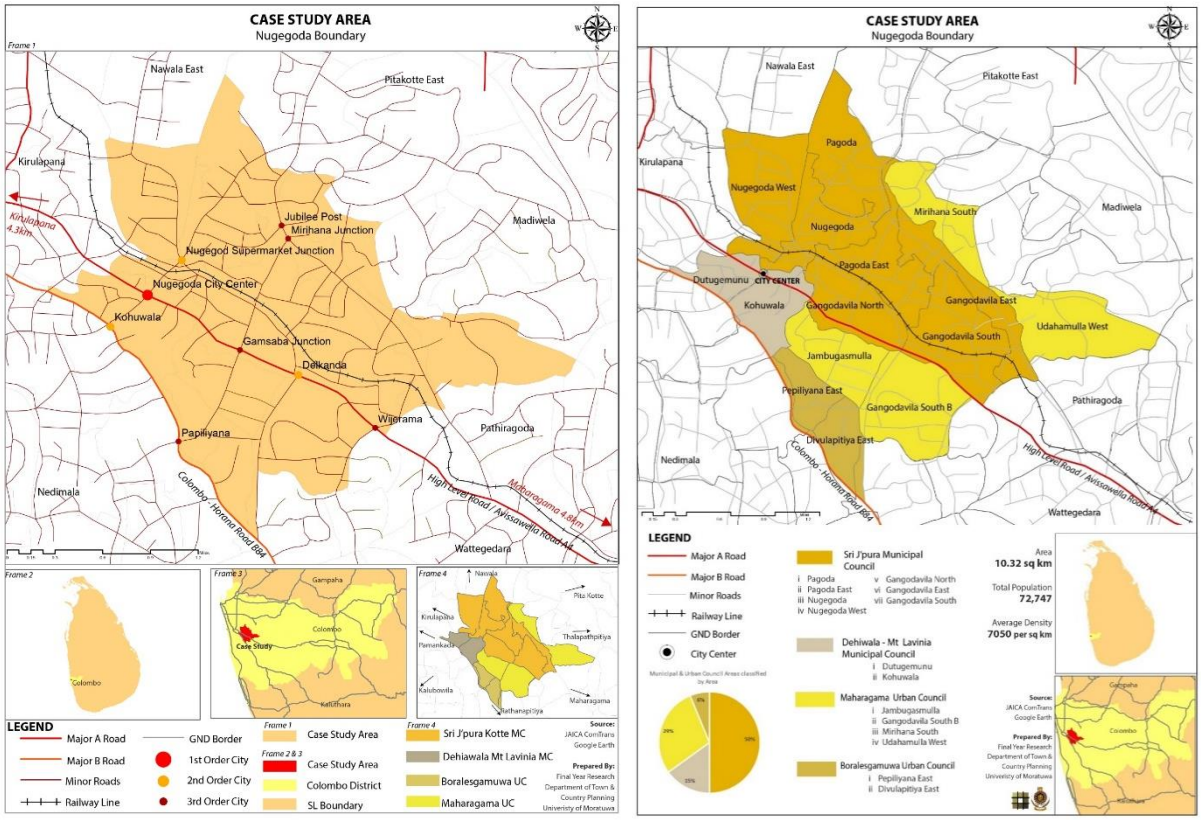

Figure 2, Boundary delineation of the case study area; Nugegoda (*Source: JAICA ComTrans, Google Earth*)

3.3 ANALYSIS STAGE II: Model stimulation on the Case Study Area

In the second stage of analysis a Multi Criteria Analysis (MCA) technique was used where it considers all above mentioned different variables and calculated influence weights (Output 1 & 2) to create the valuation Index map. Under the MCA technique, a weighted overlay GIS tool is being used to create the final output, a spatial valuation Index. (Output 3). It enables to rank the various factors in terms of their applicability.

3.3.1 Data Collection for the Geodatabase

Out of 20 spatial variables that impact a common local area, the following (Table3) are the 17 spatial variables that were shortlisted for Nugegoda. Accordingly, georeferenced spatial layers were digitized to generate the Nugegoda Spatial Variation Index (SVI), the aforesaid model's main outcome.

Table 3, Collected geodata and their formats

Class	Variable	Format	Source
Accessibility	Distance to Main/Sub City Center	Vector: Point	Google Earth: Digitization
	Distance to Major A/B Roads	Vector: Polyline	JAICA ComTrans Data
	Distance to Railway Stations	Vector: Point	Google Earth: Digitization
	Distance to Bus Stations	Vector: Point	Google Earth: Digitization
	Distance to Highway Entrance	***Not Considered*** *- Differentiation between two plots is not considerably high in Nugegoda local Area.*	
	Distance to Airport		
	Breadth of Main Access Road	Vector: Polyline	Google Earth: Digitization
Physical Environment	Distance to Health Institutes	Vector: Point	Google Earth: Digitization
	Distance to Education Institutes	Vector: Point	Shapefile: Sri J'pura MC
	Distance to 1st order grocery shopping	Vector: Point	Google Map: Imports
	Distance to 2nd order grocery shopping	Vector: Point	Google Map: Imports
	Distance to 3rd order grocery shopping	***Not Considered*** *- Unavailability of data in Nugegoda local Area.*	
	Distance to green & blue (Recreational spaces)	Vector: Point	Shapefile: Sri J'pura MC
	Use of Land	Vector: Polygon	Google Earth: Digitization
	Type of Land	Vector: Polygon	Shapefile: Sri J'pura MC
Social Neighbourhood	Neighborhood Class	Vector: Polygon	Census & Statistics
	Passive Security	Vector: Polyline	JAICA ComTrans Data
	Cleanliness	Vector: Point	Shapefile: Sri J'pura MC

3.3.2 Assumptions & limitations of the model

This model is limited to **"Urban", "Local"** areas within Colombo Metropolitan Region (CMR). It only considers urban context -spatial variables that could impact on the value of properties. Also, it's open for customization according to the local area's context. The model only considers the spatial factors that affect a property but not physical or economic condition of individual properties.

Contour Difference, Availability of Electricity & water, Disaster proof areas, Distance to highway and airports are a few more variables identified by stakeholders as having an impact on property value, although it was assumed that these variables have no substantial impact because they do not fall under the category of "Urban" or are unrelated to the "Nugegoda Case Study Area." The future infrastructure developments' impacts on property values were not considered. The model was formed with the current data.

3.4. ANALYSIS STAGE III: Identification of the correlation between each variable and property value

In Final Stage of Analysis, the question of "to what extent can these spatial variables impact on property value?" has been explored. A Sample of fairly distributed data points of property value (87) were abstracted from a simple random sampling method for the previous analysis, was then subjected to find the correlations and finally derive an equation with all the significant variables, using multiple linear regression analysis.

3.4.1 Analysis of Correlation

All the ordinal variables (data that can be categorized) out of the previous set were subjected to the analysis of correlation. Those variables' true property assessment value and corresponding reclassification number (between 1-10, used in modeling) were used to create the SPSS database. The Pearson's coefficient of correlation was used to calculate the strength between each spatial factor and property value.

3.4.2 Analysis of Multi Linear Regression model

Multi Linear Regression is an expansion of linear regression that predicts values of a property's assessed value (Y) based on several spatial variables in this study (X). It will create an equation based on the impact of 11 independent variables on the dependent variable. In generating the equation, any variables with a high significance level (variables with less than 5% error) will only be considered as independent variables. When the spatial variables' values of a property are entered, this equation will stimulate values in specified places.

4. Results and Discussion

The discussion contains the results of the research's objectives, which are to determine and explore **what spatial variables** have an impact on property value **at what scale** in a local urban area in Sri Lanka. The results of the **finalized list of spatial variables** for the Case Study Area were detailed, including **influence percentages** and their respective rankings, **Model Stimulation outcomes, Map Interpretations** justified with real ground scenario and **Coefficient correlations** between variables and values.

4.1. RESULTS OF ANALYSIS STAGE I

4.1.1 Spatial Variables impacting on a local urban property's value

Through a cross referenced analysis between the stakeholder interviews and in-depth literature review, following spatial variables (Table 4) were identified as the **impacting factors on a common local urban area.** (More suitable in CMR). Use of arithmetic mean and percentage equation, their weights out of 10 (10 being the highest) in a Likert scale and influence % out of 100 is derived as follows. (Table 4)

It explains that none of the 20 variables have an influence percentage greater than 10%, indicating that they are all relatively relevant and have nearly equal impact on property value. It's clearly shown in the following figure 3 illustrating the rather fair distribution of the influence percentages.

Table 4, Final identified list of spatial variables & their influence percentage

X_i	Variable	Stakeholder 01	Stakeholder 02	Stakeholder 03	Stakeholder 04	Stakeholder 05	Stakeholder 06	Mean Likert Value $\overline{Xi}$	Influence % (I)
X_1	Distance to Main City	9	10	10	10	8	10	9.500	6.786%
X_2	Distance to Sub City	8	7	9	8	8	9	8.167	5.833%
X_3	Distance to "A" Road	9	10	10	9	9	10	9.500	6.786%
X_4	Distance to "B" Road	8	9	9	9	7	8	8.333	5.952%
X_5	Distance to Railway Stations	6	5	3	3	4	7	4.667	3.333%
X_6	Distance to Bus Halts	7	7	6	6	6	8	6.667	4.762%

X_7	Distance to Highway Entrance/ Exists	5	0	7	0	0	9	3.500	2.00%
X_8	Distance away from Disastrous Areas	7	8	6	7	5	7	6.667	4.762%
X_9	Breadth of Main Access road	8	8	8	8	8	7	7.833	5.595%
X_{10}	Distance to Health Institutes	7	6	8	6	7	7	6.833	4.881%
X_{11}	Distance to Educational Institutes	8	6	7	6	6	8	6.833	4.881%
X_{12}	Distance to 1st Order grocery shopping	9	6	9	7	7	9	7.833	5.595%
X_{13}	Distance to 2nd Order grocery shopping	8	5	8	6	7	7	6.833	4.881%
X_{14}	Distance to 3rd Order grocery shopping	7	7	6	5	0	3	4.667	3.333%
X_{15}	Distance to Recreational Spaces	6	7	8	6	6	9	7.000	5.000%
X_{16}	Use of Land	7	7	8	8	7	9	7.667	5.476%
X_{17}	Type of Land	6	5	6	7	6	7	6.167	7.405%
X_{18}	Neighborhood Class	8	8	8	6	7	9	7.667	5.476%
X_{19}	Neighborhood Security	9	9	8	7	6	2	6.833	4.881%
X_{20}	Cleanliness	7	7	8	5	6	8	6.833	4.881%
Σ								140	**100%**

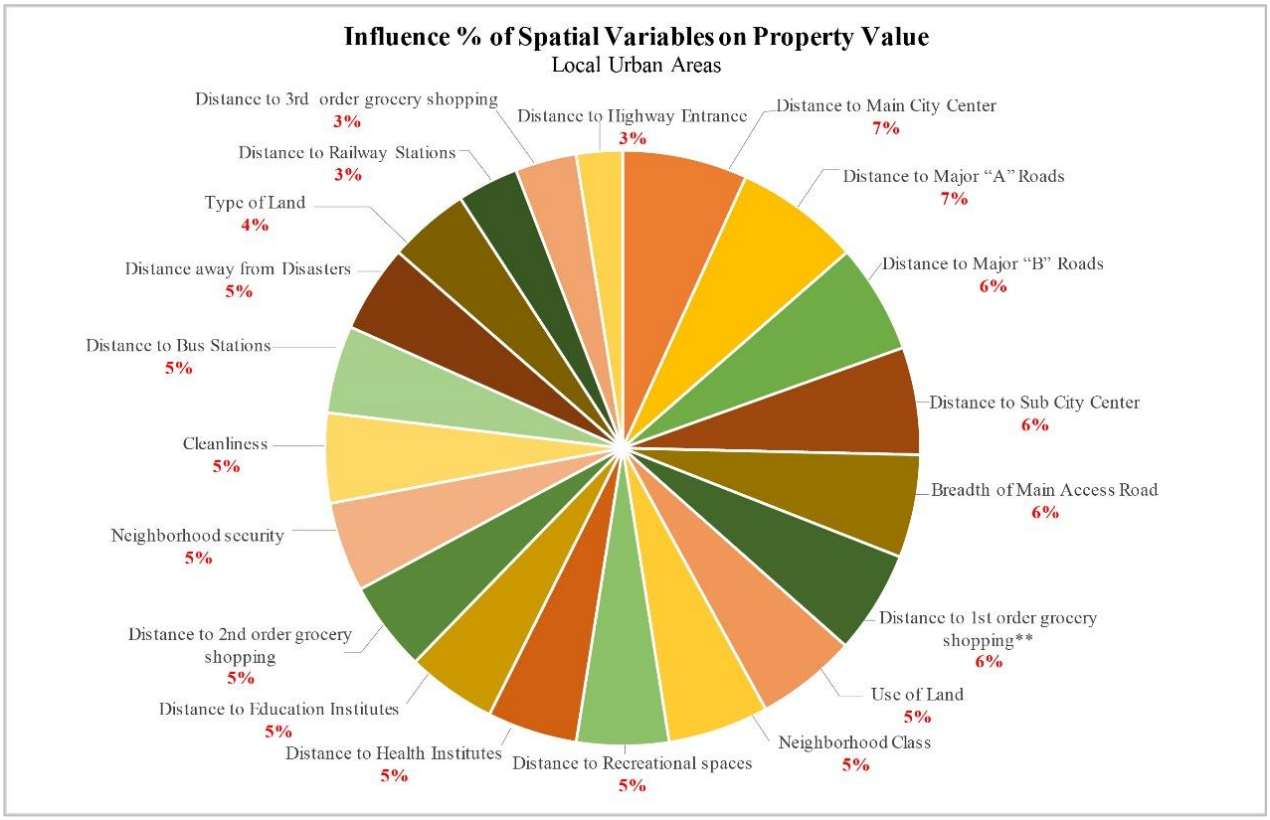

Figure 3, Influence percentage of spatial variables for a local urban area *(Source: Created by Author)*

Figure 4 shows the summary of all the spatial variables impacting property value in an urban local area in their respective mean Likert values and influence percentages. Accordingly, the distance to the main city and major "A" class roads are the most influential variables, followed by distance to major "B" class roads and distance to sub-cities. In terms of physical infrastructure, a first-order supermarket shopping mall has a much greater influence on value than a health, educational, or recreational institution. In terms of transportation modes, the distance to a bus stop (4.76%) is greater than the distance to a railway station (3.33%). The distance to a highway entrance is the least affecting variable, according to the research. The reason for this is that, while it may have a greater impact between inter-local areas, it has little impact within a local area.

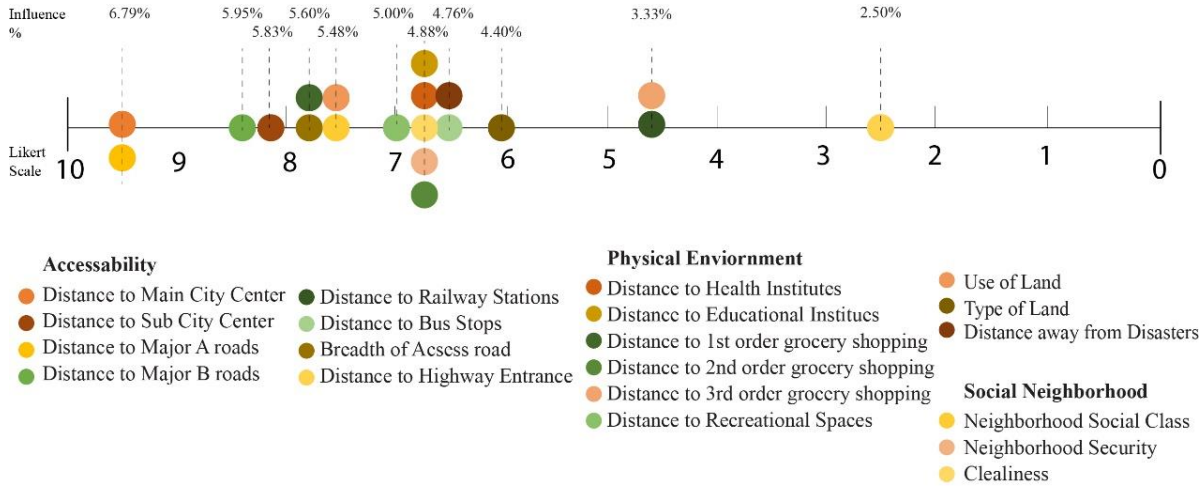

Figure 4, Summary on spatial variables' Influence *(Source: Created by Author)*

4.2. RESULTS OF ANALYSIS STAGE II

4.2.1 Final Model Result: Spatial Valuation Index (SVI)

The weighted overlay's result of 17 spatial variables, "The Spatial Valuation Index" is depicted in raster format as follows (Figure 6). It shows the value variation in a 2D plane considering only spatial factors into account. This is referred to as the "spatial heterogeneity" of the Nugegoda Case Study Area.

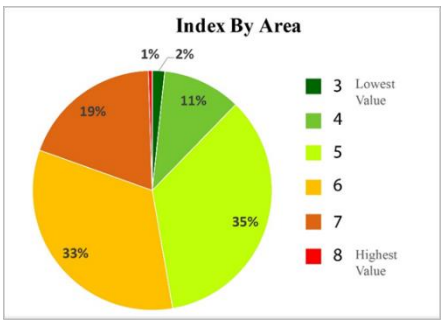

Figure 5. Area covered by each Index

Table 5, Area covered by each Index

Index	Colour	Total Area / Sq. km
3		0.1604
4		1.0201
5		3.3643
6		3.1904
7		1.8281
8		0.0510
		9.6143

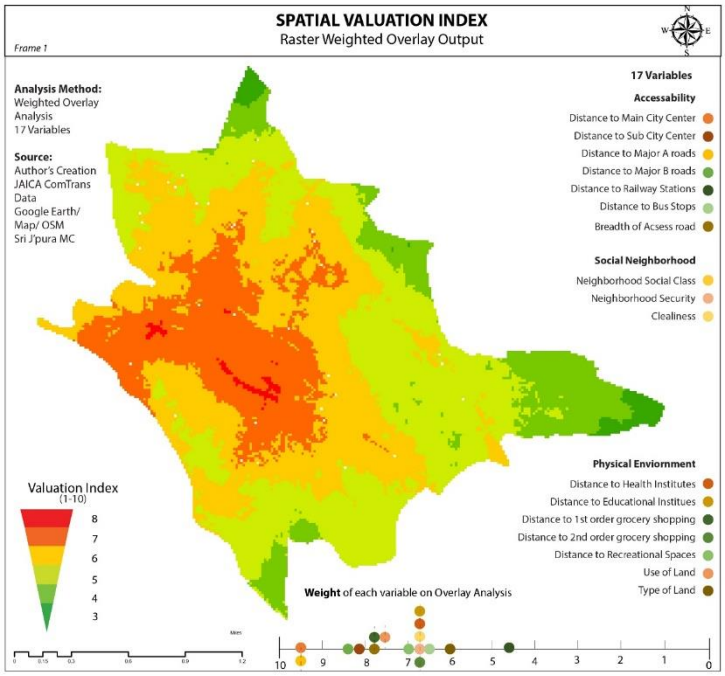

Figure 6, Model Outcome: Spatial Valuation Index
(*Source*: – GIS, MCA Valuation Model Created by Author)

The model was built within a 1-10 scale range, with 10 representing the highest values and 1 representing the lowest. The final index has a range of 8 to 3, with 8 being the highest and 3 being the lowest. It highlights that for all 17

variables, none of the areas are evaluated as higher than 8 or lower than 3. Simply put, none of the places have the highest or lowest value, but are evenly dispersed on a moderate scale.

4.2.2 Model Validation

Using a simple random sampling method, it calculates how many data points are predicted correctly to the range it belongs. As result, the model generates overall **79.31%** accurate information regarding Property value which is considered a fair model.

4.2.3 Model interpretations Vs real ground justifications

Not only does the SVI display which areas have high or low values, but it also directs configurations such as spread outs, clusters, or unique deviations, all of which have a true rationale for their behaviour. Accordingly, it shows in which areas the potential is growing. In this case, the spread towards Delkanda, was highlighted from the model.

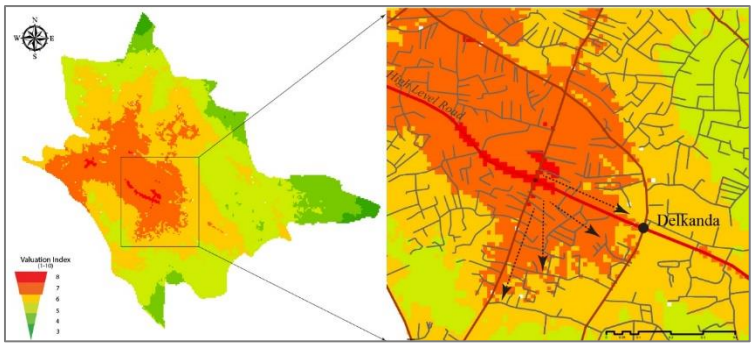

Figure 7, Interpretation near Delkanda spread

4.3. RESULTS OF ANALYSIS STAGE III

4.3.1 Summary of correlation relationships between property values and spatial variables

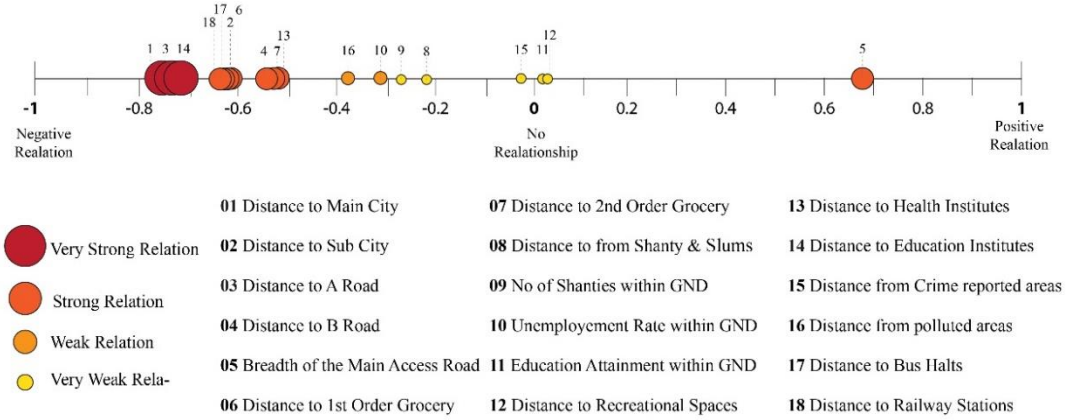

Figure 8, Correlation Ranking (*Source*: – SPSS Outcome)

The strongest relationship is created by distance to the main city. Next, the distance to the major "A" class road, the distance to educational institutes, and the breadth of the access road have stronger relationships, regardless of their direction. (positive or negative). The social class has the poor connections. In conclusion, it indicates that, more Accessibility class variables have had a bigger impact on property value, compared to the social neighbourhood variables, which are of minor importance.

4.3.2 Multi Linear Regression Equation

According to the output of SPSS Regression model, the derived equation has an adjusted R^2 (Coefficient of determination) of 0.758 which specifies that 75.8% of the variance in the dependent variable is explained by these following 11 independent variables as a whole. Rest is due to the other insignificant variables.

$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \ldots + b_nx_n$

$Y = 181.612 - (4.479\ x_1) + (0.738\ x_2) - (2.096\ x_3) + (1.644\ x_4) + (3.848\ x_5) - (4.602x_6) + (0.938\ x_7) - (2.055\ x_8) - (2.066\ x_9) - (1.443x_{10}) + (1.959\ x_{11})$ (1) Derived Equation

Table 6, Equation Components

b_n	Value	x_n	Variable	b_n	Value	x_n	Variable
b_0	181.612	-	-	b_6	-4.602	x_6	Distance to 1st order grocery

b_1	-4.479	x_1	Distance to Main City	b_7	0.938	x_7	Distance to 2nd order grocery
b_2	0.738	x_2	Distance to Sub City	b_8	-2.055	x_8	Distance to Health Institutes
b_3	-2.096	x_3	Distance to A road	b_9	-2.066	x_9	Distance to Education Institutes
b_4	1.644	x_4	Distance to B road	b_{10}	-1.443	x_{10}	Distance to Bus Halts
b_5	3.848	x_5	Breadth of Main Access road	b_{11}	1.959	x_{11}	Distance to Railway Stations

5. Conclusion

The first objective of this research is to identify the spatial variables that impact the property value, in an urban local area. After the literature review and stakeholder interviews, a set of 20 spatial variables have been shortlisted as common primary factors & 17 of them had a substantial impact in Nugegoda Case Study Area. It was identified that both the distances to Main City and Major "A" class road has the highest influence over property value. The second objective is to identify the extent these spatial variables can impact through a testing for an urban local area in Colombo. In order to investigate, a Spatial Valuation Index is constructed utilizing GIS technology while preserving the Stakeholder's Insights as the foundation. The extent these variables impacted Nugegoda was calculated through correlation analysis and generated the regression equation to estimate each plotted value. This study would serve as a business pitch to advising firms, in creating property market valuations for buyers and sellers depending on "location". Furthermore, software and applications (Apps) can be developed in such a way that any party involved in the process can generate their own property prices utilizing such timely automated valuation models.

6. References

Adhikaro, R. & Agrawal, R., 2013. An Introductory study on time series modeling and forecasting. *LAP Lambert Academic Publishing.*

Chan, A. & Abidoye, R., 2019. Advanced property valuation techniques and valuation accuracy: Deciphering the artificial neural network. *RELAND: International Journal of Real Estate & Land Planning,* pp. 1-9.

Fregonara, E., Rolando, D. & Semeraro, P., 2012. The value of spatial component in the real estate market: the Turin case study. *Aestimum,* pp. 85-113.

Gilbertson, B. & Preston, D., 2005. A vision for valuation. *Journal of property investment and Finance,* pp. 123-140.

Grover, R., 2015. Mass Valuation. *Journal of Property Investment and Finance,* pp. 191-204.

Oud, D. A. J., 2017. GIS based property valuation. *Doctoral dissertation, MS Thesis, Dept. of Geographical sciences-geo-information applications and management,* p. 70.

Pagourtzi, E., Assimakopoulos, V., Hatzichristos, T. & French, N., 2003. Real Estate appraisal; a review of valuation methods. *Journal of property investment and finance.*

Santos, Laurent, Jiang & Rui, 2020. Spatial Analysis for House Price Determinants. *UCL.*

Seal, J., 2019. *Definition of Property Value.* [Online]
Available at: https://homeguides.sfgate.com/definition-property-value-6890.html

Tao, C., 2010. On the use of analytical network process for modeling housing prices; A chongqing perspective. *City University of Hong Kong.*

Vanags, J., Geipele, I., Usenieks, D. & Sarkans, A., 2017. Hosuing Heterogeneity dimensions and their elements: a systematic approch. *Baltic Journal of Real Estate Economics and Construction Management,* pp. 23-37.

Wasantha, A. V., Weerakoon, K. K. & Wickramaarachchi, N. C., 2012. Rating Valuation model for residential properties in Sri Lanka: Case study in Homagama. *Sri Lanka Journal of Real Estate.*

Wilkinson, S., Antoniades, H. & Halyitigala, D., 2017. *The future of the valuation profession: Shaping the strategic direction of the profession for 2030.* s.l., s.n., pp. 1-9.

Zandi, G. et al., 2018. The Economical factors affecting residential property price, The case of Penang. *International Journal of Economics and Finance.*