Factors Affecting Residential Use Land Values in the Inter Development Segment of the Colombo City

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ABSTRACT.   *The objective of this study was to investigate the factors affecting the market values of residential building sites in a sub-urban area of Colombo and to make use of the existing relationships among these factors as guide-lines to estimate the values of residential sites.*

This study was conducted within the urban development planning unit of Narahenpita. Details in respect of a total of 54 public auction sales conducted on three different dates at three different locations were considered for this purpose. The multiple linear regression technique was adopted to ascertain the existing relationship between land values and the seven variables viz electricity, water, site extent, drainage, sewerage, number of bids, frontage, and distance to bus routes. Three variables out of the seven were selected for the final model with 0.81 of R^2 value. In the model selection process, it was found that electricity water and drainage were highly correlated with distance to the bus route. Various professionals and prospective buyers and sellers can use site extent, number of bids and distance to bus route as a measure of land value in making their decisions.

INTRODUCTION

Colombo city has a land area of 3731 ha and out of this 96.28 ha of land is covered by lakes, channels and other inland water bodies. Private land owners have claimed about 73% of the total land extent and the remainder is distributed among the state and the Colombo Municipality as 21% and 6% respectively (UDA 1980). The Study area is the Narahenpita ward of the Colombo Municipality with a potential for development, which can be described as an inter-development

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segment of the Colombo city. It consists of the land between Kotte – Sri Jayawardenapura area and the already developed Colombo Municipal area. A recent survey conducted by the Urban Development Authority identified the different land use categories in this area (Table 1). According to the municipality records, the Colombo city has a resident population of about 625,000. It also has about 600,000 commuter travellers per day (UDA, 1980).

Table 1.   Different categories of available lands in the Colombo municipality area.

Type of land use	Extent	Percentage
Commercial	201.49	5.4
Residential	1686.54	45.2
Industrial	149.25	4.0
Public Roads	749.99	20.1
Under developed	380.59	10.2
Other (Water bodies Low – lying lands etc)	563.42	15.1
	3731.28	100.00

Source: Urban Development Authority, Colombo, 1980

Property values in an urban area depend on many factors and some of the important components of property values can be listed as follows.

(a)   Physical factors external to the property : The geographic location, the environment (class of residents, and the type of residences in the immediate neighborhood and proximity to places of importance), transport and infrastructural services such as electricity, water, drainage (sewerage) and telephone.

(b) Factors integral to the property.   The physical factors of the property (lie of the land, soil, shape and size) accessibility and economic and legal attributes and/or liabilities (title and planning regulations).

(c) The national and local economic conditions which determine the level of property values.

As for any other commodity, the value of landed property will also be largely determined by the market forces of supply and demand, although it can be said that the physical supply of landed property as a whole is fixed or completely inelastic.   However it is not true of a particular type or a specified extent of landed property.   In the long run, land can be transferred from one use to another.   Even in the short run landed property can be converted from one use to another. For example, residential accommodation can be converted to commercial uses or, agricultural lands can be transferred into industrial lands.   The paddy lands in Sri Lanka however, are protected from being transferred to any other uses by virtue of the statutory provisions given in the Paddy Land Act 1958 and subsequent amendments.   The economic supply of land for a particular use is therefore not fixed although a fixed supply still remains unchanged for land as a whole.

Demand for residential land is derived from the basic needs of man.   Space or shelter is required for man for all his activities. Further, the overall demand for landed property will gradually change over time.   Some of the factors affecting the demand for land are:

1.   Changes in population
2.   Changes in the general standard of living
3.   Changes in taste, fashion and preferences
4.   Movements in population
5.   Improvements in methods of transport and communication
6.   Level of the purchasing power

Value of a land primarily depends on the use of that land. As Ricardo mentioned in his classic work, the land value for agricultural uses depends on it's fertility and the type of the land.   He clearly shows that if all the characters of the lands were the same the land values would not have been different   (Abeygunawardena and Fernando, 1992). Further, the limited quantities of available land or scarcity of the land

resources fetch a price for a unit of land. In this study, the overall factors affecting the land values in general were not considered. Only the factors affecting a particular type of land use — the residential use — in the Colombo city were addressed.

Land is both a factor of production and also a consumption item where it is used for agricultural purposes and/or to construct a residential building. Sometimes land is also used as a device to store wealth against inflation. Further, sometimes a land is more durable than any other commodity and thus, it appreciates in value over time. Land is consumed for a longer period, (once a house is constructed) till the life – span of its initials use is over. Such uses become physically, economically, and functionally obselete over time. Once the structure is demolished however, a new land is again available for any other purpose. Unlike many other capital items therefore land has an entirely different residue or salvage value. (Raleigh, 1972; Folke, 1987).

Ultimately all these factors contribute to form an opinion about the subjective valuation of the potential buyer's willingness to pay for land. This will reveal the level of ceiling price of prospective buyers and to set the floor price of the seller. The open market value of a land will be determined between the said ceiling and the floor prices upon the bargaining strength of the seller and the buyer (Wiggins, 1979).

Because of this complex nature of the supply, demand interaction between the land resources is not easy to understand and henceforth to identify the factors affecting the property value. In the extensive survey of the related literature, it was not possible to find any prior research on this area in Sri Lanka. Therefore the objectives of this study are to:

1. Identify the relative importance of the factors affecting the residential land values in (sub urban areas of) Colombo

2. Make use of the identified factors setting the initial bidding price at public auctions of the residential building sites in the same area.

METHODS

It is assumed that there exists a linear relationship between the value of a land (dependent variable; Y) and K number of independent variables; namely X_1 to X_k. Thus the functional relationship between land value and selected independent variables is established as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + e \underline{\hspace{3cm}}(1)$$

Where Y is the land value in rupees per perch and X's are the independent variables.

Seven independent variables namely electricity, water service, extent of the land, drainage (sewerage), number of bids, frontage and the bus route were considered as important to the proposed model. Influence of the services is measured by the distance in feet from the building block to each service. Therefore the estimable regression model can be written as follows.

Land value = f(*diel, diwa, exte, didr,* bids, *fron, dibu*)

Y = land value per perch (rupees)
X_1 = *diel* = distance to electricity main (feet)
X_2 = *diwa* = distance to water main (feet)
X_3 = *exte* = extent of the land (perches)
X_4 = *didr* = distance to drainage main (feet)
X_5 = bids = number of bids
X_6 = *fron* = frontage to the road (feet)
X_7 = *dibu* = distance to bus route (feet)

Every step was taken to avoid specification errors in the model. That is not to include irrelevant independent variables into the model and also not to exclude any relevant explanatory variables from the model. Further, to avoid the selection of an incorrect mathematical form of the regression equation, besides the linear model, two other models were also tested.

The measuring frontage was initially not considered. The width of the roads vary from 10 feet to 50 feet (see block out plans). For example a land having a frontage of 25 feet to a 10 feet wide road is

not equivalent to a land with a frontage of 25 feet to a 50 feet wide road and they will have to be brought into a common norm. Once they are brought to a common norm, the above example will be as follows. The frontage to 10 feet wide road will be only 5 feet (10/50 x 25=5) comparatively to 25 feet frontage to a 50 feet wide road (50/50 x 25=25). In this manner problems with this data were rectified, before use in the analysis.

Land value data collected for this study were based on the sales of three different dates, at three different places. Thus there is a time difference and due to this, there will be an error involved when comparing the nominal values of these data. This was also rectified by bringing all the land values as at 22.09.1990 prices, where it is required, by adding the interest for the time lapsed.

Data collection

The study area covers an extent of about 354 hectares with a population of about 30,000 in the inter – development segment of the Colombo city. The main character of the area in general, can be described as medium income residential area with public buildings and non – residential users along the base road. This is quite common in most of the residential land properties all over the country. Therefore valuation officers, potential buyers, land brokers and any other interested parties would be able to use the results of this study.

Face values given in Title Deeds (deed considerations) of private land transactions are often understated because of stamp duty. Hence this data are not suitable for analysis. They will be biased, inconsistent and do not reflect the market value of a land block. The data used in this study have been limited only to the land values that are determined where the open market had operated (i.e. public auctions) and thus the accuracy of land value information is very high.

Land value data were collected from three auction sales of 54 residential building sites at three different places sold on three different dates. Sale numbers 1 – 17 have taken place at a public auction in Thalakotuwa, Narahenpita, Colombo 05 held on 22.09.1990. The sale numbers 18 – 28 took place at a public auction at Lake Drive off Sri Jayawardenapura Mawatha held on 30.12.1989, and sale numbers 29 –

54 have taken place at a public auction in Narahenpita off Kirimandala Mawatha and Dabare Mawatha held on 31.03.1990. The block out plan with other details regarding all the sales are given in Figures 1 to 3. Each person entering the auction sale premises had to pay an entrance fee of Rs. 100.00. A total of 87 people were present at the public auction held at Thalakotuwa observations which are numbered as 1 to 17.

RESULTS AND DISCUSSION

The data set was analyzed using the Statistical Analysis System package and as a first step the data set was checked for outliers. Based on the error plots it was found that the data are distributed randomly around the mean in the case of each independent variable and no outliers were present. Further the error plots were carefully examined to see whether there was a pattern of distribution causing heteroscedasticity. No such pattern of distribution in the error plots were found. Thus it implies that the assumption, stochastic disturbance in the error term normally distributed, has not been violated. The problem of multicollinearity was also examined. (Conial, 1986). The correlation matrix among the independent variables is given in Table 2. It appeared that the following pairs of independent variable viz., distance to water and distance to electricity, distance to water and distance to bus route, and distance to drainage main were highly correlated. Therefore it is suspected that there may be multicollinearity among these variables. In order to clarify this further the Condition Numbers were calculated. It was found that the Condition Numbers are very much less than the significant levels and therefore it was concluded that there is no severe problem of multicollinearity. Since the data set is from a cross sectional survey there cannot be a serious problem of auto-correlation. However the auto-correlation was checked by performing the Durbin Watson test and the results (DW = 2.02) indicated that it was not significant at a level of 5%. (Kmenta, 1971; Kennedy, 1985).

Table 2.   The correlation matrix among the independent variables.

DIEL	DIWA	EXTE	DIDR	BIDS	FRON	DIBU
1.0000	0.8827	0.15796	0.26107	0.04273	0.12040	0.17514
(0.0)	(0.00)	(0.258)	(0.059)	(0.761)	(0.391)	(0.209)
	1.0000	0.05665	0.28041	0.01435	−0.4467	0.27261
	(0.0)	(0.690)	(0.044)	(0.919)	(0.001)	(0.051)
		1.00000	−0.3451	0.44709	0.99677	0.99837
		(0.0)	(0.011)	(0.000)	(0.000)	(0.000)
			1.00000	−0.6070	−0.3477	−0.2914
			(0.0)	(0.000)	(0.011)	(0.034)
				1.00000	0.45807	0.41735
				(0.0)	(0.001)	(0.002)
					1.00000	0.99485
					(0.0)	(0.000)

Since steps have been taken to avoid specification error and testshave been carried out for multicoliniarity presence of outliers, and violation of assumptions, the data set is suitable to apply the OLS method. The estimated beta values or unknown coefficients of the variables are given in equation 2.
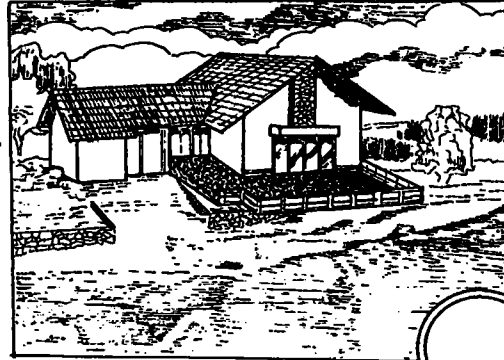
$$Y = 48227 - 150.9X_1 + 114.7X_2 + 3629.3X_3 - 4849.6X_4$$
$$+ 1985.1X_5 + 33.3X_6 + 5075.1X_7 \qquad (2)$$

$$R^2 = 0.87 \qquad Adj - R^2 = 0.85$$

The estimated R^2 (the coefficient of determination) of the model was 0.87, it was significant at 0.001 level.   The adj R^2 was 0.85 indicating that the number of observations and degrees of freedom adjustments were quite acceptable.
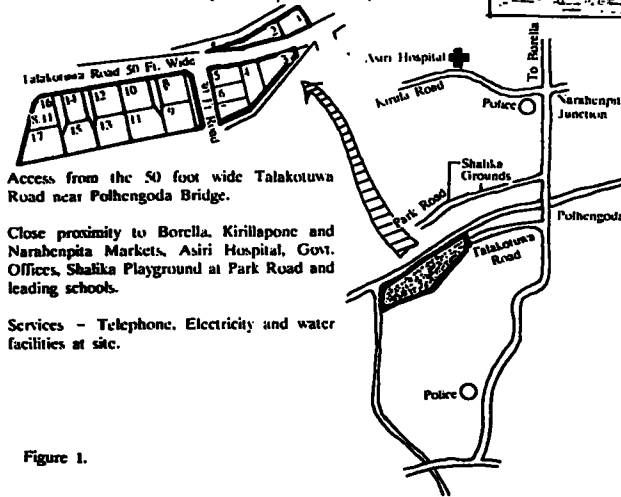
BUILD YOUR DREAM HOME IN A BEAUTIFUL LOCATION IN COLOMBO 5.

GRAND AUCTION SALE OF

17 PRIME BUILDING BLOCKS

(8 – 12 perches each)

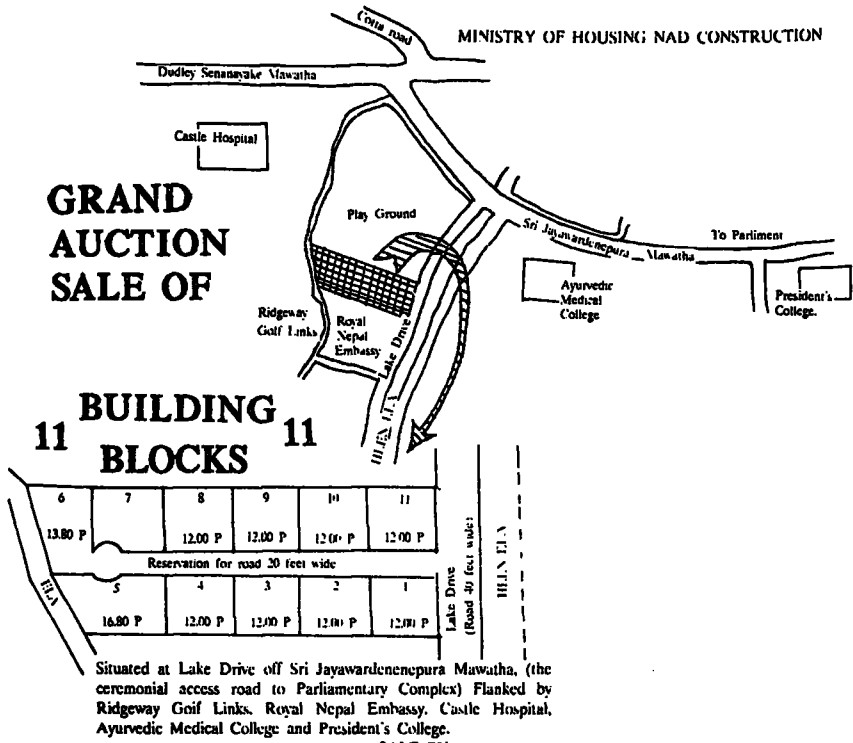Access from the 50 foot wide Talakotuwa Road near Polhengoda Bridge.

Close proximity to Borella, Kirillapone and Narahenpita Markets, Asiri Hospital, Govt. Offices, Shafika Playground at Park Road and leading schools.

Services – Telephone. Electricity and water facilities at site.

Figure 1.

CONDITIONS OF SALE:

a. Non refundable advance payment of 10% of the selling price will have to be paid by the highest bidder at the fall of the hammer. The balance payment along with 1/8 of the promotional expenses will have to be paid within 20 days. at the time of signing the deed.

b. 1% of the total purchase price as local Authority charges has to be paid by the buyer.

c. Auctioneer's commission has to be paid by the buyer.

d. An Entrance fee of Rs.100/– will be charged.

e. All payments in cash only.

MINISTRY OF HOUSING NAD CONSTRUCTION

Cotta road

Dudley Senanayake Mawatha

Castle Hospital

GRAND
AUCTION
SALE OF

Play Ground

Sri Jayawardenepura Mawatha

To Parliment

Ridgeway Golf Links

Royal Nepal Embassy

Ayurvedic Medical College

President's College.

Lake Drive

11 BUILDING 11
BLOCKS

6	7	8	9	10	11
13.80 P		12.00 P	12.00 P	12.00 P	12.00 P

Reservation for road 20 feet wide

5	4	3	2	1
16.80 P	12.00 P	12.00 P	12.00 P	12.00 P

Lake Drive (Road 40 feet wide)

Situated at Lake Drive off Sri Jayawardenepura Mawatha, (the ceremonial access road to Parliamentary Complex) Flanked by Ridgeway Golf Links, Royal Nepal Embassy, Castle Hospital, Ayurvedic Medical College and President's College.

SALE BY

PUBLIC AUCTION
on 30th December 1989 10.00 a.m. at the site

CONDITIONS OF SALE:

1. A nonrefundable advance payment of 10% of the selling price will have to be paid by the Highest bidder at the fall of the hammer.

2. The balance payment will have to be made within 30 days at the time of signing the deed.

3. All payments in cash only.

Figure 1.

GRAND AUCTION SALE OF

BUILDING
26 BLOCKS 26

Situed in a peaceful and a picturesque environment within the City.
Access from Kirimandala Mawatha and Dahare Mawatha of Elvitigala
Mawatha, Narahenpita, Colombo 05.

SALE BY

PUBLIC AUCTION

On 31st March 1990 10.00 a.m.

at the Site

CONDITIONS OF SALE

* A refundable advance payment of 10% of the selling price will
  have to be paid by the highest bidder at the fall of the
  hammer.

* The balance payment will have to be made within 20 days at
  the time of signing the deed.

* All payments in cash.

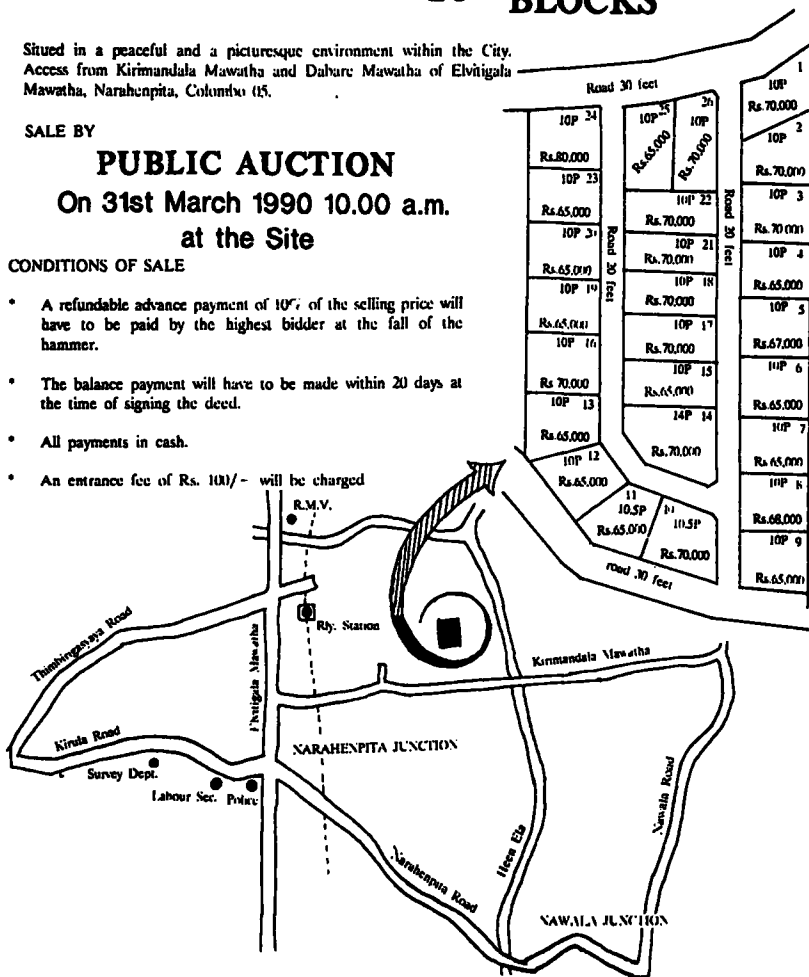* An entrance fee of Rs. 100/- will be charged

Figure 3

The independent variables distance to water service, extent and frontage were not significant in this model. Since these variables were not significant it was decided to drop them and re–estimate the regression model with the other four variables namely *diel, didr,* bids & *dibu.* The results are given in equation 3.

$$Y = 127972 + 164X_1 - 64X_4 + 1888X_5 - 3X_7 \underline{\hspace{2cm}} (3)$$

$$R^2 = 0.89 \qquad \text{Adj } R^2 = 0.86$$

The selected four independent variables had a very high significant (0.0001) impact in determining the value of a unit of land. Distance to electricity was positively related to the value of the land. The signs of the other three parameters (*didr,* bids, didu) were as expected. In Colombo city unlike other areas when the distance to bus route is taken all the other services *i.e.* electricity, water *etc.* are available within this distance. Therefore it was decided to include independent variables *dibu,* bids, and *exte* and re–estimate the regression model without the distance to electricity. The results estimated R^2 was 0.81 with all three variables significant at 0001 level.

The results are given in equation 4:

$$Y = 115796 + 1670.3X_3 + 2075.2X_5 - 53X_7 \underline{\hspace{2cm}} (4)$$

$$R^2 = 0.81 \qquad \text{Adj } R^2 = 0.79$$

According to the above discussion, the distance to bus route includes all the services too in Colombo city. When one takes the extent of the land, frontage is also included. There cannot be a frontage without the extent but there can be an extent of land without a frontage. If the above argument is correct, without "*dibu*" variable the regression model should have a low R^2 value. In order to test this proposition the model was re–estimated without the "*dibu*" variable. The results are given in equation 5:

$$Y = 59302 - 71X_3 + 3568X_5 \underline{\hspace{2cm}} (5)$$

$$R^2 = 0.59 \qquad \text{Adj } R^2 = 0.57$$

According to these results the land extent explained the value of up to 58% and (using the previous results) it can be seen that infra-structural services account for about 22% of the land value. From these models it is quite apparent that the reduced model 3 is the most appropriate model to assess the factors affecting residential land values in the city of Colombo. This confirms the Hurd's well known statement about the urban land values; as quoted from 1903 "Since value depends on economic rent and rent on location, and location on convenience and convenience on nearness. Therefore one may eliminate the intermediate steps and say that land value depends on nearness".

From these results (Y = 115796 + 16703.1 + 2075.21 − 5258) = 129316, (Say Rs. 129,500.00 p.p.), if a residential block of land in extent 10 perches in extent is available for sale about 100 feet away from a bus route in Narahenpita Ward of the Colombo Municipality, what the seller will expect can be estimated as Rs. 129,500.00 p.p. (floor price). This can be used by anybody who wants to sell a land in Narahenpita area to find the floor price as at October 01, 1990. If one wants to use this in the future, these figures must be adjusted for inflation and land value appreciation in the area.

If there are five probable buyers for one block of land, then the value will go up because of the competition among these buyers. Using the equation (3), (Y = 115796 + 16703.1 + 2075.21(5) − 5258) = 137617, (Say Rs. 138,000.00 p.p.), the estimated value will be Rs. 138,000.00 p.p. for the same block. A seller can use this to fix the price, say Rs. 138,000.00 per perch as floor price to begin negotiations. Likewise these estimates can be used to estimate values of residential building sites in Narahenpita Ward with different conditions *i.e.* land is located about 200 feet away from the bus route and where the estimated floor price is about Rs. 124,000.00 p.p. in the same area. Therefore, it appears that for a drop of 100 feet from the bus route, the value of a residential block of 10 perches drops by about Rs. 5500.00 per perch. This is very useful for a property developer to take decisions on property management. Further the Valuation Department may use this or similar information in the future in valuation process, of landed properties. Finally it is worthy to note that as physical factors are considered in this model, environmental services such as scenic view, clean air *etc.* could also be isolated according to their relative importance in terms of land values in the future.

CONCLUSION AND POLICY IMPLICATIONS

Property owners, prospective buyers, real estate credit agencies, tax assessors, property developers and many others have frequent need for value figures indicating the worth of individual properties for various purposes. The figures quoted in different legal documents were even found to be far from the true market value of the property. Often determination of property value figures for different purposes such as credit purposes or paying compensation *etc.* is usually accomplished through a property appraisal process. Therefore the objective of this study was to investigate the vital factors affecting the market values of residential building sites in inter development segment of the Colombo city with the view of bringing up environmental characteristics attached to landed properties in valuation exercises in the future.

Conscious efforts have been made recently to improve and formalize the techniques used in appraisal work. As a result most professional appraisers proceed on a more scientific basis now than in the past. Value of a piece of land cannot be derived by considering the bundle of things as a whole, only those parts that can serve the purposes of an eventual buyer are relevant to one's estimate of value, and those bidding against someone for the same property may have different considerations. Sellers often reserve their right not to sell unless their minimum asking price has been met. Further decisions by sellers and buyers include a number of individual mistakes. As for any other commodity, landed property is also subject to market mechanisms provided that the legal and other structures are well specified. Therefore, construction of sufficiently specific models to explain the actual economic behaviour is required although such efforts have their limitations.

Based on the results of this study residential land value can be explained in the Colombo area primarily based on three variables; namely, extent of the land block, distance to the bus route and the number of prospective bids. The estimated R^2 value of the model with these variables was 0.81 and all three variables were significant at 0.0001 level with proper signs. For example, the sign for the bus route was negative and the sign for the other two variables were positive as expected. Results clearly indicate, although the land is located in the Colombo city limits, still, distance to the bus route explains a larger amount of variation in land values. This is because the bus route,

although seeming a single variable, carries several other features such as distance to the source of water and availability of electricity.

The last factor, number of bids, indicates the importance of properly developed market mechanism to determine the value of land. When the number of bids is higher the land value is also higher. Finally it can be concluded that if the distance to the bus route, site extent and the number of probable bids is known, the value of a residential block in Colombo can be estimated fairly accurately. The immediate policy implication of such a finding is that the authorities who are concerned with the land values can use such information to assess the approximate land value even without expert opinions. Further, such findings can be extended to investigate the relative importance of other similar factors such as scenic view, clean air and the value of a good neighborhood. Although these items are not traded directly in the market, the hedonic price approach and contingent valuation methods and the modified land value method can be adopted by the researchers in investigating such information.

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